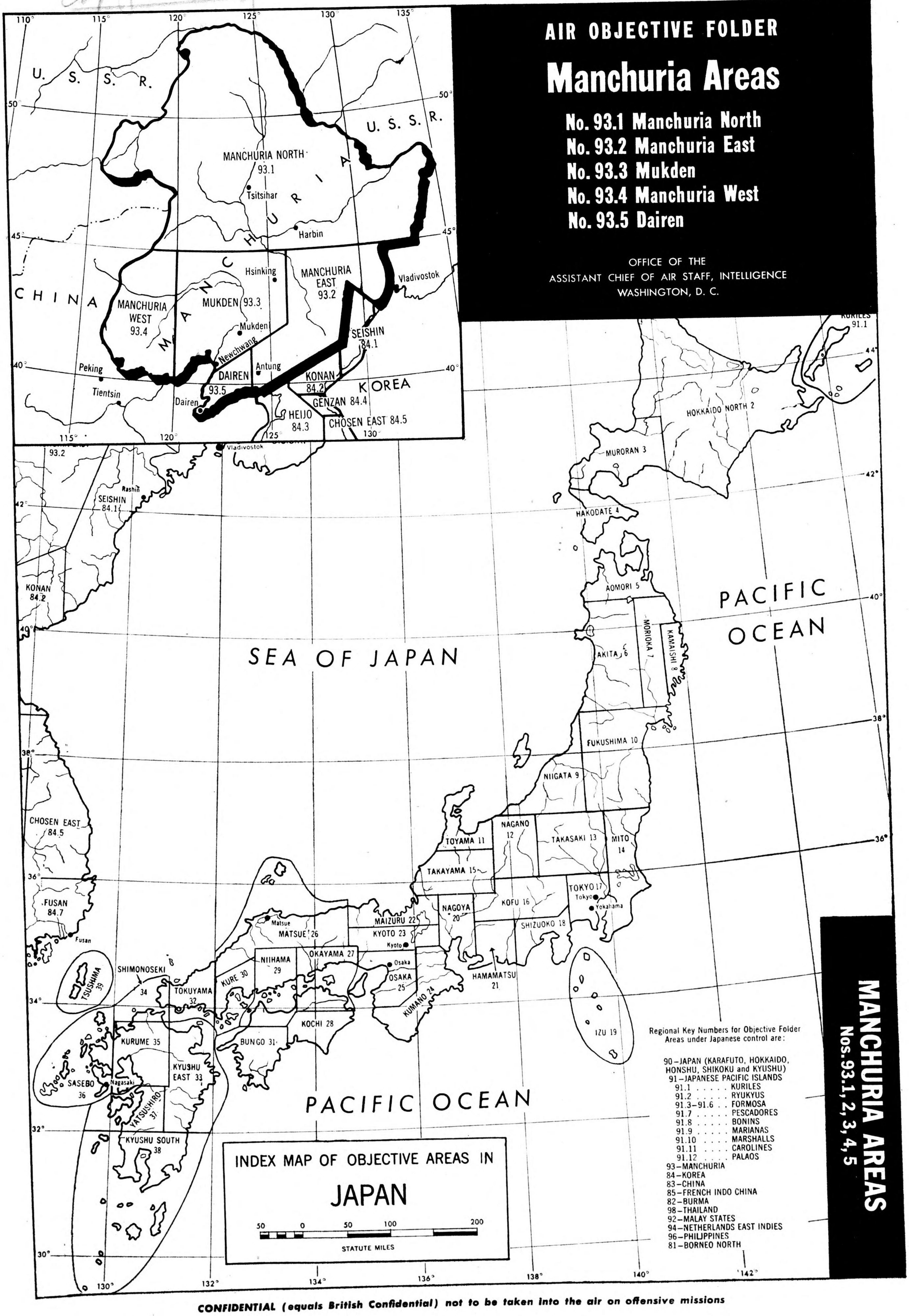
Issued July 31, 1944

AIR OBJECTIVE FOLDER

Manchuria Areas

No. 93.1 Manchuria North
No. 93.2 Manchuria East
No. 93.3 Mukden
No. 93.4 Manchuria West
No. 93.5 Dairen

OFFICE OF THE
ASSISTANT CHIEF OF AIR STAFF, INTELLIGENCE
WASHINGTON, D. C.



MANCHURIA AREAS
Nos. 93.1, 2, 3, 4, 5

Regional Key Numbers for Objective Folder Areas under Japanese control are:

90—JAPAN (KARAFUTO, HOKKAIDO, HONSHU, SHIKOKU and KYUSHU)
91—JAPANESE PACIFIC ISLANDS
91.1 . . . . . KURILES
91.2 . . . . . RYUKYUS
91.3—91.6 . . FORMOSA
91.7 . . . . . PESCADORES
91.8 . . . . . BONINS
91.9 . . . . . MARIANAS
91.10 . . . . MARSHALLS
91.11 . . . . CAROLINES
91.12 . . . . PALAOS
93—MANCHURIA
84—KOREA
83—CHINA
85—FRENCH INDO CHINA
82—BURMA
98—THAILAND
92—MALAY STATES
94—NETHERLANDS EAST INDIES
96—PHILIPPINES
81—BORNEO NORTH

CONFIDENTIAL (equals British Confidential) not to be taken into the air on offensive missions

Issued July 31, 1944

AIR OBJECTIVE FOLDER, MANCHURIA

MANCHURIA AREAS, Nos. 93.1, 2, 3, 4, 5

No. 93.1 MANCHURIA NORTH
No. 93.2 MANCHURIA EAST
No. 93.3 MUKDEN
No. 93.4 MANCHURIA WEST
No. 93.5 DAIREN

TABLE OF CONTENTS

INDEX:

Alphabetical Index of Targets ____ 2
Numerical Index of Targets ____ 2
Classified Index of Targets ____ 3

TEXT-PHOTO SECTION:

Summary and Evaluation of Manchuria ____ 4

Dairen Region

Index of Targets in Dairen Region ____ 11
Summary and Evaluation of Dairen Region ____ 11
Target Descriptions and PHOTOS, Dairen Region ____ 12

Anshan Region

Index of Targets in Anshan Region ____ 31
Summary and Evaluation of Anshan Region ____ 31
Target Descriptions and PHOTOS, Anshan Region ____ 32

Penhsihu Region

Index of Targets in Penhsihu Region ____ 36
Summary and Evaluation of Penhsihu Region ____ 36
Target Descriptions and PHOTOS, Penhsihu Region ____ 37

Mukden Region

Index of Targets in Mukden Region ____ 41
Summary and Evaluation of Mukden Region ____ 41
Target Descriptions and PHOTOS, Mukden Region ____ 42

Fushun Region

Index of Targets in Fushun Region ____ 47
Summary and Evaluation of Fushun Region ____ 47
Target Descriptions and PHOTOS, Fushun Region ____ 48

Northern Manchuria Regions: Harbin, Tsitsihar, Chiamussu, Hailar

Index of Targets in Northern Manchuria ____ 55
Summary and Evaluation of Northern Manchuria ____ 55
Target Descriptions and PHOTOS, Northern Manchuria ____ 56

Outlying Targets

Index of Outlying Targets ____ 60
Target Descriptions and PHOTOS, Outlying Targets ____ 61
Weather Information, Manchuria ____ 73
Gazetteer and Glossary, Manchuria ____ 99
Map Information, Manchuria ____ 100
Target Chart Information, Manchuria ____ 102

MAP SECTION:

Index Map of Objective Areas in Manchuria and Japan ____ COVER
Target Index Map of Manchuria Areas ____ FOLD-UP
Physiographic Map of Manchuria Areas ____ M-1
Airport Map of Manchuria ____ M-2
Relief Model of Anshan Region (photos) ____ M-3
Port Arthur ____ M-4
Dairen and Vicinity ____ M-5
Anshan and Vicinity ____ M-6
Iron Mines (Anshan District) ____ M-6
Showa Steel Works (Anshan) ____ M-7
Penhsihu ____ M-8
Penhsihu and Vicinity ____ M-8
Mukden City Plan ____ M-9
Mukden Region ____ M-9
Fushun and Vicinity ____ M-10

M—refers to pages in map section

Harbin and Vicinity ____ M-10
Tsitsihar and Vicinity ____ M-10
Chiamussu and Vicinity ____ M-11
Hailar and Vicinity ____ M-11
Yingkou and Vicinity ____ M-12
Hulutao and Vicinity ____ M-13
Lower Yalu River Region ____ M-13
Antung-Shingishu Region ____ M-14
Suiho Hydro-Electric Development ____ M-15
Hsinking and Vicinity ____ M-16
Kirin and Vicinity ____ M-18
Transportation Map of Northeast Asia ____ POCKET
Eastern Asia 1:1,000,000 (AMS 5301) Series:
Shenyang (Mukden) NK 51 ____ POCKET
Ryozyun NJ 51 ____ POCKET
Vladivostok NK 52 ____ POCKET
Harbin NL 52 ____ POCKET

5154 ~~2630~~ 1—Manchuria—7-11-44—First Proof

NOTICE

Although not generally revised, certain small changes and deletions have been made in this reprint.

OFFICE OF THE
ASSISTANT CHIEF OF AIR STAFF, INTELLIGENCE
WASHINGTON, D. C.

PREPARED WITH THE ASSISTANCE OF
MILITARY INTELLIGENCE DIVISION, NEW YORK
AND TIME INC.

CONFIDENTIAL equals British Confidential

NOT TO BE TAKEN INTO THE AIR ON OFFENSIVE MISSIONS

Alphabetical Index of Targets in Manchuria Areas, Nos. 93.1, 2, 3, 4, 5

Target Name	Target Number	Text Page
Amanagawa Steam Power Plant	93.5— 27	22
Antung RR Yards	93.2— 72	66
Dairen Machinery Co.	93.5— 17	22
Dairen Machinery Mfg. Co.	93.5—170	46
Dairen Piers	93.5— 13	16
Fuhsin Steam Power Plant	93.3— 39	64
Fushun RR Yards & Repair Shops	93.3— 63	51
Harbin RR Bridge No. 1	93.1— 92	56
Harbin RR Bridge No. 2	93.1—113	56
Harbin RR Repair Shops	93.1—114	56
Harbin RR Yards & Warehouses	93.1— 91	56
Hsinking RR Yards	93.3—363	71
Huangkutun RR Repair Shops	93.3—178	46
Hulutao (Koroto) Lead & Zinc Smelter	93.3—187	62
Hulutao Port Facilities	93.3—172	62
Hun River RR Bridge	93.3—367	45
Jijoko Oil Storage Area	93.5—197	17
Kanseishi Coal Pier	93.5— 15	27
Kanseishi Steam Power Plant	93.5— 8	25
Kirin Artificial Oil Co.	93.2— 58	69
Kirin Hydro-electric Plant	93.2— 55	70
Kirin RR Yards & Repair Shop	93.2—364	68
Kyowa Industrial Co.	93.3—179	46
Manchuria Airplane Mfg. Co., Plant No. 1	93.3—177	44
Manchuria Airplane Mfg. Co., Plant No. 2	93.3— 45	44
Manchuria Coal Liquefaction Co.	93.3— 43	69
Manchuria Dockyard Co.	93.5— 10	21
Manchuria Electric Wire Co.	93.3— 52	46
Manchuria Hitachi Engineering Works	93.3—182	46
Manchuria Iron Works	93.3—166	44
Manchuria Light Metals Co., Fushun Plant	93.3— 32	52
Manchuria Machine Tool Co.	93.3—164	46
Manchuria Magnesium Industry Co.	93.3— 34	61
Manchuria Petroleum Co.	93.5— 1	26
Manchuria Soda Co.	93.5— 20	25
Manchuria Synthetic Fuel Co.	93.3—175	64
Manchurian Chemical Industry	93.5— 19	25
Mukden Arsenal	93.3— 46	44
Mukden Engineering Works	93.3—165	46
Mukden RR Yards	93.3— 53	46
Mutanchiang RR Yards	93.2—366	65
Naval Dockyard	93.5— 11	29
Naval Oil Storage	93.5— 6	29
Onoda Cement Works	93.5— 54	30
Oriental Steel Products Co.	93.3—168	46
Oriental Tire Industry	93.3—181	46
Penhsihu Iron Works (New Plant)	93.3—171	37
Penhsihu Iron Works (Old Plant)	93.3— 30	37
Showa Steel Works	93.3— 29	32
SMR Coal Liquefaction Plant	93.3— 41	52
SMR Shale Oil Plant	93.3— 40	48
SMR Sulphuric Acid Plant	93.3— 62	52
South Manchurian Railway Central Laboratory	93.5—184	21
South Manchurian Railway Workshops	93.5— 16	23
Ssupingkai RR Yards & Repair Shops	93.3—362	69
Suchiatun RR Junction	93.3—173	45
Suifenho RR Repair Shops & Yards	93.2—365	65
Suiho Hydro-electric Plant	93.2— 56	65
Sumitomo Metal Works	93.3— 50	46
Taikanton Steam Power Plants	93.3— 35	50
Taishi River RR Bridges	93.3—368	71
Tashito Harbor Facilities	93.2— 85	67
Tatung Harbor Facilities	93.2—188	67
Tsitsihar RR Repair Shops & Yards	93.1—155	58
Tunghua Steel Works	93.2— 57	67
Yalu River RR Bridges	93.2— 77	66
Yingkou (Newchwang) Harbor Facilities	93.3—174	61

Numerical Index of Targets in Manchuria Areas, Nos. 93.1, 2, 3, 4, 5

Target, Number	Name	Text Page
1	Manchuria Petroleum Co.	26
6	Naval Oil Storage	29
8	Kanseishi Steam Power Plant	25
10	Manchuria Dockyard Co.	21
11	Naval Dockyard	29
13	Dairen Piers	16
15	Kanseishi Coal Pier	27
16	South Manchurian Railway Workshops	23
17	Dairen Machinery Co.	22
19	Manchurian Chemical Industry	25
20	Manchuria Soda Co.	25
27	Amanagawa Steam Power Plant	22
29	Showa Steel Works	32
30	Penhsihu Iron Works (Old Plant)	37
32	Manchuria Light Metals Co., Fushun Plant	52
34	Manchuria Magnesium Industry Co.	61
35	Taikanton Steam Power Plants	50
39	Fuhsin Steam Power Plant	64
40	SMR Shale Oil Plant	48
41	SMR Coal Liquefaction Plant	52
43	Manchuria Coal Liquefaction Co.	69
45	Manchuria Airplane Mfg. Co., Plant No. 2	44
46	Mukden Arsenal	44
50	Sumitomo Metal Works	46
52	Manchuria Electric Wire Co.	46
53	Mukden RR Yards	46
54	Onoda Cement Works	30
55	Kirin Hydro-electric Plant	70
56	Suiho Hydro-electric Plant	65
57	Tunghua Steel Works	67
58	Kirin Artificial Oil Co.	69
62	SMR Sulphuric Acid Plant	52
63	Fushun RR Yards & Repair Shops	51
72	Antung RR Yards	66
77	Yalu River RR Bridges	66
85	Tashito Harbor Facilities	67
91	Harbin RR Yards & Warehouses	56
92	Harbin RR Bridge No. 1	56
113	Harbin RR Bridge No. 2	56
114	Harbin RR Repair Shops	56
155	Tsitsihar RR Repair Shops & Yards	58
164	Manchuria Machine Tool Co.	46
165	Mukden Engineering Works	46
166	Manchuria Iron Works	44
168	Oriental Steel Products Co.	46
170	Dairen Machinery Mfg. Co.	46
171	Penhsihu Iron Works (New Plant)	37
172	Hulutao Port Facilities	62
173	Suchiatun RR Junction	45
174	Yingkou (Newchwang) Harbor Facilities	61
175	Manchuria Synthetic Fuel Co.	64
177	Manchuria Airplane Mfg. Co., Plant No. 1	44
178	Huangkutun RR Repair Shops	46
179	Kyowa Industrial Co.	46
181	Oriental Tire Industry	46
182	Manchuria Hitachi Engineering Works	46
184	South Manchurian Railway Central Laboratory	21
187	Hulutao (Koroto) Lead & Zinc Smelter	62
188	Tatung Harbor Facilities	67
197	Jijoko Oil Storage Area	17
362	Ssupingkai RR Yards & Repair Shops	69
363	Hsinking RR Yards	71
364	Kirin RR Yards & Repair Shop	68
365	Suifenho RR Repair Shops & Yards	65
366	Mutanchiang RR Yards	65
367	Hun River RR Bridge	45
368	Taishi River RR Bridges	71

3654—2—Manchuria—12-11-44—First Proof

Classified Index of Targets in Manchuria Areas, Nos. 93.1, 2, 3, 4, 5

CLASSIFICATION AND NAME	TARGET NUMBER	LOCATION (GENERAL)	APPROXIMATE COORDINATES	TEXT ON PAGE	MAP ON PAGE	PHOTO ON PAGE
AIRCRAFT						
Manchuria Airplane Mfg. Co., Plant No. 2	45	Mukden	41° 51′N 123° 26′E	44	M-9	
Manchuria Airplane Mfg. Co., Plant No. 1	177	Mukden	41° 48′N 123° 30′E	44	M-9	44
ARMS & MUNITIONS						
Mukden Arsenal	46	Mukden	41° 48′N 123° 29′E	44	M-9	44
Manchuria Iron Works	166	Mukden	41° 48′N 123° 28′E	44	M-9	44
CEMENT						
Onoda Cement Works	54	Paoyaitun	38° 58′N 121° 31′E	30		30
CHEMICALS						
Manchurian Chemical Industry	19	Kanseishi	38° 58′N 121° 37′E	25	M-5	25
Manchuria Soda Co.	20	Kanseishi	38° 58′N 121° 37′E	25	M-5	25
SMR Sulphuric Acid Plant	62	Fushun	41° 50′N 123° 51′E	52	M-10	52
South Manchurian Railway Central Laboratory	184	Dairen	38° 55′N 121° 37′E	21	M-5	21
COAL AND COKE						
Kanseishi Coal Pier	15	Kanseishi	38° 58′N 121° 38′E	27	M-5	27, 28
ELECTRIC POWER						
Kanseishi Steam Power Plant	8	Kanseishi	38° 58′N 121° 37′E	25	M-5	25
Amanagawa Steam Power Plant	27	Dairen	38° 55′N 121° 35′E	22	M-5	22
Taikanton Steam Power Plants	35	Fushun	41° 51′N 123° 52′E	50	M-10	50, 51
Fuhsin Steam Power Plant	39	Fuhsin	42° 06′N 121° 38′E	64		
Kirin Hydro-electric Plant	55	Fengmen	43° 42′N 126° 41′E	70		70
Suiho Hydro-electric Plant	56	Suiho	40° 27′N 124° 55′E	65	M-15	65
ELECTRICAL EQUIPMENT						
Manchuria Electric Wire Co.	52	Mukden	41° 48′N 123° 22′E	46	M-9	
HARBOR FACILITIES						
Dairen Piers	13	Dairen	38° 56′N 121° 39′E	16	M-5	15, 16
Tashito Harbor Facilities	85	Tashito	39° 50′N 124° 25′E	67	M-13	
Hulutao Port Facilities	172	Hulutao	40° 44′N 121° 01′E	62	M-13	62, 63
Yingkou (Newchwang) Harbor Facilities	174	Yingkou	40° 41′N 122° 12′E	61	M-12	61
Tatung Harbor Facilities	188	Tatung	39° 54′N 124° 11′E	67	M-13	
IRON & STEEL						
Showa Steel Works	29	Anshan	41° 05′N 122° 56′E	32	M-6, 7	32, 33, 34
Penhsihu Iron Works (Old Plant)	30	Penhsihu	41° 20′N 123° 46′E	37	M-8	37, 38, 39, 40
Tunghua Steel Works	57	Erhtaokou (E of Tunghua)	41° 44′N 126° 01′E	67		
Penhsihu Iron Works (New Plant)	171	Miyanohara (Penhsihu)	41° 18′N 123° 46′E	37	M-8	
MACHINES AND MACHINE TOOLS						
Dairen Machinery Co.	17	Dairen	38° 54′N 121° 34′E	22	M-5	22
Sumitomo Metal Works	50	Mukden	41° 48′N 123° 22′E	46	M-9	
Manchuria Machine Tool Co.	164	Mukden	41° 48′N 123° 28′E	46	M-9	
Mukden Engineering Works	165	Mukden	41° 49′N 123° 22′E	46	M-9	
Oriental Steel Products Co.	168	Mukden	41° 48′N 123° 22′E	46	M-9	
Dairen Machinery Mfg. Co.	170	Mukden	41° 48′N 123° 22′E	46	M-9	
Kyowa Industrial Co.	179	Mukden	41° 49′N 123° 22′E	46	M-9	
Manchuria Hitachi Engineering Works	182	Mukden	41° 49′N 123° 22′E	46	M-9	
NAVAL BASES						
Naval Dockyard	11	Port Arthur	38° 48′N 121° 16′E	29	M-4	29
NON-FERROUS METALS						
Manchuria Light Metals Co., Fushun Plant	32	Fushun	41° 50′N 123° 47′E	52	M-10	
Manchuria Magnesium Industry Co.	34	Yingkou	40° 40′N 122° 20′E	61		
Hulutao (Koroto) Lead & Zinc Smelter	187	Hulutao	40° 44′N 120° 56′E	62	M-13	

3654-93-Manchuria-12-11-44-First Proof

CLASSIFIED INDEX OF TARGETS FOR MANCHURIA AREA, NOS. 93.1, 2, 3, 4, 5

CLASSIFICATION AND NAME	TARGET NUMBER	LOCATION (GENERAL)	APPROXIMATE COORDINATES	TEXT ON PAGE	MAP ON PAGE	PHOTO ON PAGE
PETROLEUM						
Manchuria Petroleum Co.	1	Kanseishi	38° 58′N 121° 39′E	26	M-5	26
Naval Oil Storage	6	Port Arthur	38° 48′N 121° 16′E	29	M-4	29
SMR Shale Oil Plant	40	Fushun	41° 51′N 123° 51′E	48	M-10	48, 49, 50
SMR Coal Liquefaction Plant	41	Fushun	41° 50′N 123° 48′E	52	M-10	
Manchuria Coal Liquefaction Co.	43	Ssupingkai	43° 12′N 124° 22′E	69		
Kirin Artificial Oil Co.	58	Lungtanshan	43° 50′N 126° 35′E	69		
Manchuria Synthetic Fuel Co.	175	Chinchow	41° 07′N 121° 06′E	64		
Jijoko Oil Storage Area	197	Dairen	38° 55′N 121° 41′E	17	M-5	17, 18, 19
RUBBER						
Oriental Tire Industry	181	Mukden	41° 47′N 123° 21′E	46	M-9	
SHIPBUILDING						
Manchuria Dockyard Co.	10	Dairen	38° 56′N 121° 39′E	21	M-5	15, 21
TRANSPORTATION						
South Manchurian Railway Workshops	16	Dairen	38° 56′N 121° 35′E	23	M-5	23, 24
Mukden RR Yards	53	Mukden	41° 47′N 123° 23′E	46	M-9	
Fushun RR Yards & Repair Shops	63	Fushun	41° 51′N 123° 51′E	51	M-10	
Antung RR Yards	72	Antung	40° 07′N 124° 22′E	66	M-13, 14	
Yalu River RR Bridges	77	Antung	40° 07′N 124° 23′E	66	M-13, 14	66, 67
Harbin RR Yards & Warehouses	91	Harbin	45° 45′N 126° 36′E	56	M-10	
Harbin RR Bridge No. 1	92	Harbin	45° 48′N 126° 37′E	56	M-10	57
Harbin RR Bridge No. 2	113	Harbin	45° 48′N 126° 40′E	56	M-10	
Harbin RR Repair Shops	114	Harbin	45° 47′N 126° 37′E	56	M-10	
Tsitsihar RR Repair Shops & Yards	155	Tsitsihar	47° 20′N 123° 59′E	58	M-10	58, 59
Suchiatun RR Junction	173	Suchiatun	41° 40′N 123° 21′E	45	M-9	
Huangkutun RR Repair Shops	178	Mukden	41° 49′N 123° 23′E	46	M-9	
Ssupingkai RR Yards & Repair Shops	362	Ssupingkai	43° 11′N 124° 21′E	69		
Hsinking RR Yards	363	Hsinking	43° 54′N 125° 19′E	71	M-16	71, 72
Kirin RR Yards & Repair Shop	364	Kirin	43° 51′N 126° 33′E	68	M-18	68
Suifenho RR Repair Shops & Yards	365	Suifenho	44° 24′N 131° 09′E	65		
Mutanchiang RR Yards	366	Mutanchiang	44° 35′N 129° 37′E	65		
Hun River RR Bridge	367	Mukden	41° 45′N 123° 23′E	45	M-9	45
Taishi River RR Bridges	368	Liaoyang	41° 18′N 123° 12′E	71		

3654 ~~3644~~—44—Manchuria—7-1-11-44—Hirrell proof

Summary and Evaluation of Manchuria Areas, Nos. 93.1, 2, 3, 4, 5

GENERAL: The Kwantung Army's long-range plan for Manchurian self-sufficiency has not been fully accomplished, but is well enough along to currently make Manchuria of major industrial as well as direct military importance to Japan.

As a result of the accelerated development since the 1931 Incident, northern Manchuria is now one vast military zone and southern Manchuria is one of the five major industrial centers in the Japanese system, with both supported by a modern and high-capacity railroad system.

The Mukden-Anshan-Fushun region in southern Manchuria is the focal point for iron/steel works with 20-25 per cent of total capacity under Japanese control, shale and synthetic oil plants accounting for an estimated 50% of the oil production in Japan's Inner Zone, and other industry of primary war importance.

Mukden, the largest city in Manchuria, is the site of the great Mukden Arsenal and numerous large and modern satellite plants which constitute the most extensive industrial concentration in the country.

Anshan, some 60 miles southwest of Mukden, is the site of the Showa Steel Works, the largest single industrial installation on the Asiatic Mainland and the second largest integrated iron/steel plant in the Japanese system. The Anshan works and the two smaller plants at Penhsihu, 50 miles east from Anshan, account for around 90 per cent of Manchurian iron/steel capacity and are the backbone of Japan's industrial exploitation of Manchuria. With both iron ore and coal relatively accessible, it is

SUMMARY AND EVALUATION OF MANCHURIA AREAS Nos. 93.1, 2, 3, 4, 5

believed that the capacity of the Manchurian plants has been more fully utilized than capacity in Japan Proper, and that substantial shipments have been made to Japan.

Fushun, 25 miles east from Mukden, has long been the center of developed coal production, and typifies the newer Japanese exploitation of Manchurian resources. Fushun is the site of the South Manchurian Railway plant which obtains oil from the extensive oil shale overlying the coal and is rated the most important Inner Zone source of oil products. The shale oil plant and the group of so-called synthetic oil plants processing southern Manchuria coal account for at least 50 per cent of Japan's Inner Zone production of oil from all sources, the importance of which would be substantially increased by denial to Japan of NEI oil.

Relatively recent key development in the Manchurian plan are the hydro-electric installations at Suiho, some 60 miles inland from the mouth of the Yalu River, and on the Sungari River near Kirin. Put into operation since 1941, these are by far the largest hydro developments in the Far East, and are the first installations in the projected large-scale utilization of waterpower resources as a basis for further expansion of Manchurian industry. The bulk of the country's present generating capacity, however, is in a few large steam plants, of which the most important concentration is at Fushun. With one or two important exceptions, Manchurian power can now be interchanged by the recently completed network.

Among the elements in the Manchurian plan which have been most publicized by Japan since 1941 is the claimed exploitation of Manchurian aluminous shales, magnesite, and lead and zinc ores, as a means of independence from distant seized sources of these basic war materials. The Japanese have had every incentive for such efforts, but any substantial achievement along these lines would be dependent in part on development of large hydro-electric capacity, on availability of specialized equipment, upon remarkable technological progress, and upon comparable success in increasing mine production.

Manchuria is railroading country in the American sense. It has an extensive and well-engineered network of standard gauge railroad, with modern heavy-duty motive power and rolling stock. The South Manchurian Railway has been rated one of the world's best operated railroads. The great bulk of traffic is in the short-haul but heavy coal and ore tonnage in the Anshan-Mukden-Fushun section. The rail network is a vital strategic element, which is being given increased importance by improved connections with North China and with the Korean route to Japan.

In Dairen, Manchuria has the finest mainland port development north of Shanghai. While the Japanese shipping situation has made for increased overland traffic through Korea, Dairen remains a strategically situated and well-equipped port for both commodity and military use.

Manchurian industrial development is concentrated in the narrow southern outlet of the great central mountain-encircled plain, which is important in its own right as an agricultural region. This plains area has always been sparsely populated and continues to be, despite Japanese efforts, because of climate considerably more rigorous than that of Japan.

This folder lists 71 objectives, of which, on the basis of available information, the following are rated as Key Targets in Japan's wartime economy:

KEY OBJECTIVES

No.	Name	Location	Page
29	Showa Steel Works	Anshan	32
30	Penhsihu Iron Works (Old Plant)	Penhsihu	37
35	Taikanton Steam Power Plants	Fushun	50
40	SMR Shale Oil Plant	Fushun	48
46	Mukden Arsenal	Mukden	44
171	Penhsihu Iron Works (New Plant)	Miyanohara (Penhsihu)	37

AIRPORTS: Although detailed information as to the number of airports and their facilities is limited, Manchuria is believed to have a well-developed and extensive network of military airfields. Since airfields are a special category of targets, the characteristics and importance of which are subject to considerable change, none are listed as objectives, but they are indicated on the airport map on page M-2.

AIRCRAFT: Definite information on Manchurian aircraft production is limited. There have been many reports of plant sites and production, but inadequate basis for evaluating what the Japanese may have achieved, their ability to provide adequate plant equipment, etc. There is direct evidence of parts production at a number of machine tool plants in Mukden, possibly fed into assembly operations there.

At Mukden, the Manchuria Airplane Manufacturing Co has a medium sized installation adjacent to the Mukden Arsenal believed to be primarily a trainer assembly plant **TARGET 93.3-177.** Plant No. 2, **TARGET 93.3-45** on the west side of North Mukden Airport is believed to be a small experimental center.

ARMS AND MUNITIONS; MACHINES AND MACHINE TOOLS: Arms and munitions manufacture in the Kwantung Army's plan for Manchurian military self-sufficiency centers around the Mukden Arsenal.

The Arsenal itself is the largest on the Asiatic Mainland, and one of the largest in the Japanese Empire. In addition, the Arsenal is the integrating center for the arms and munitions production, the many machine tool plants, and the large amount of related industry that have been built up in Mukden in the past ten years.

About 1½ miles east of the old walled city, the Arsenal **TARGET 46** extends for a mile along the highway. It produces all types of ordnance from small arms to 150 millimeter guns, grenades, explosives and ammunition. The Arsenal has its own shell and

3654—5—Manchuria—12-11-44—First Proof

SUMMARY AND EVALUATION OF MANCHURIA AREAS Nos. 93.1, 2, 3, 4, 5

cartridge filling plant, and its own 10,000 KW power plant. Into this site, for final manufacture, assembly and inspection, feed the products from the satellite plants dispersed through Mukden.

Adjacent to and west of the Arsenal is the Manchuria Iron Works **TARGET 166,** one of the principal manufacturers for the Kwantung Army. It produces gun-pointing gears, gun carriages, vehicles, flat cars, tank cars, gondolas, iron bridges, boilers, and other iron and steel products.

The Manchuria Machine Tool Co. **TARGET 164,** located north of the Iron Works and also adjacent to the Arsenal, began operations in 1940 with a monopoly of the Manchurian machine tool industry. It is equipped to manufacture machine tools, steam engines, boilers and internal combustion engines. Immediately east of the Arsenal is the Manchuria Airplane Manufacturing Co. Plant No. 1 **TARGET 177.**

A second large concentration has been established in the new industrial district west of the new Mukden Railroad Yards **TARGET 53.** From March 1935 until the end of 1937 an estimated 144 factories of various types were put into operation in this section. Included in these were 20 machine and machine tool plants, several electrical works, and 25 special iron and steel plants. Listed as targets are seven important installations manufacturing precision machines and machine tools, engines, iron and steel castings and forgings and other products, railroad rolling stock and motorized equipment, electrical equipment, and ordnance and aircraft parts.

The only other known large machines and machine tool plant in Manchuria is the Dairen Machinery Co **TARGET 17** at Dairen. It manufactures small locomotives, passenger and freight cars, aircraft parts, machine tools, tractors, auto bodies, internal combustion engines, steel bridges, castings, boilers, etc. 80% of pre-war production was in railroad equipment.

There have been reports of other sizable plants in Hsinking, but there is no detailed information. The large railroad shops in Manchuria also contribute to the production of arms. This is particularly true of the shops in Dairen, Suchiatun, and Mukden.

AUTOMOBILES: The automobile industry is a monopoly of Manchuria Automobile Manufacturing Co, successor to Dowa Automobile Co. Originally an assembly plant, this company is now believed equipped for the manufacture of Diesel engine trucks with machinery imported from the United States, and for their assembly with the equipment from the Ford Plant in Yokohama. Some reports indicate that this plant may have been moved to a new site near Antung. The location of the original plant is spotted in Mukden. Automobile bodies are produced at the Dairen Machinery Manufacturing Co, **TARGET 170** in Mukden.

CEMENT: The great hydro-electric dam projects, and the increase in industrial plant construction has required substantial production of cement in the area. Large cement plants are located at the Showa Steel Works **TARGET 29** at Anshan and the Penhsihu Iron Works, Old Plant **TARGET 30** utilizing the nearby resources of limestone as well as blast furnace slag. A third plant is located at Fushun. These three are estimated to supply at least one-third of Manchurian cement demands. The Onoda Cement Works **TARGET 54** at Paoyaitun, about ten miles northwest of Dairen, with a pre-war capacity of 255,000 tons was considered a large plant for Manchuria. The approximate locations of two other plants of unknown size in Harbin are shown on map on page M-10. The known installations in the country, however, do not account for the Manchurian cement requirements.

CHEMICALS: Inner Zone capacity exceeds minimum requirements in the basic chemicals necessary to the Japanese war economy, and the industry is widely dispersed in Japan, Korea, and Manchuria.

The Manchurian Chemical Industry **TARGET 19** at Kanseishi is the largest known nitrogen fixation plant in Manchuria and is estimated to rank fifth in the Inner Zone. It has a large production of ammonia, ammonia derivatives, sulphuric acid, and a small by-product coke production. There is some manufacture of explosives, and the ammonia produced can be used for either fertilizer or munitions. Located near this plant is the Manchuria Soda Co **TARGET 20,** the only large pre-war soda ash producer in Manchuria.

The South Manchuria Railroad at its Central Laboratory in Dairen **TARGET 184** maintains the most important industrial research center in the Far East. Studies are carried on in the chemical, metallurgical, fuel, and agricultural fields.

There have been reports of numerous chemical plants around Dairen, but the known installations are all small. Plans for large chemical plants in other parts of Manchuria were announced before the war, but there has been no concrete evidence that they have been carried out. A more recent unconfirmed report locates a new nitrogen fertilizer plant at Hulutao, equal in size to the Manchurian Chemical Industry. It would utilize the sulphuric acid which may now be in production at the new Hulutao (Koroto) Lead and Zinc Smelter **TARGET 187.**

Important chemicals, principally toluene, benzene, and naphthalene, are produced as by-products from the coke ovens at the iron and steel plants at Anshan, Penhsihu, and Tunghua. The large by-products plant at the Showa Steel Works **TARGET 29** at Anshan has been pinpointed.

The sulphuric acid requirements of the important South Manchuria Railway Shale Oil Plant **TARGET 40** at Fushun are supplied by the nearby SMR Sulphuric Acid Plant **TARGET 62.**

COAL AND COKE: Manchuria's vast coal resources have been basic in Japan's exploitation of the country and

3654—6—Manchuria—12-11-44—First Proof

SUMMARY AND EVALUATION OF MANCHURIA AREAS Nos. 93.1, 2, 3, 4, 5

in Manchuria's wartime industrial importance to Japan. The relative proximity of coal and iron ore is the basis for the iron/steel works at Anshan and Penhsihu; the older fields have not provided sufficient coal suitable for metallurgical coke, but newer developments are reducing coking coal import requirements. The bulk of Manchuria's electric power capacity is still in steam plants. Dispersed coal fields provide railroad fuel with minimum haulage. A relatively recent exploitation of Manchurian coal has been its use as raw material in the so-called synthetic oil plants. Over a period of time, considerable quantities of Manchurian coal have been exported to Japan by sea.

Manchurian coal production for 1943 has been estimated at 27,000,000 metric tons. Some 14,000,000 tons are from the Funshun/Penhsihu regions, of which 10,000,000 tons are from the Fushun mines themselves. The second largest field is to the west in Chinchou Province where mines at Fuhsin, Peipiao and Pataohao are estimated to produce some 4,000,000 tons. The newer development in the Tunghua region is credited with 1,000,000 tons. Little is known of the relatively distant and new developments of the northwest around Hokang and Tungan (Mishan), which were reported as having a 1941 scheduled production of 3,500,000 tons. Coal production around Sian and the newly developed field at Shulan is chiefly used for synthetic oil production at Ssupingkai **TARGET 43** and Kirin **TARGET 58**. The balance of estimated Manchurian production, about 2,500,000 tons, is from small mines not in the fields listed above.

These estimates are maximum and represent a substantial increase over pre-war production. Much of the increase outside the Fushun/Penhsihu regions is dependent on wartime availability of mining equipment, rolling stock and on railroad construction.

All but a fraction of Manchurian coke oven capacity, operating on both local and imported coal, is concentrated at the Anshan and Penhsihu iron and steel works. Close to 50 per cent of total coking capacity under Japanese control is credited to the cokeoven batteries at these works. This capacity is well in excess of metallurgical coke requirements for the blast furnaces. Substantial amounts of the excess are believed to be utilized in the synthetic oil plants.

ELECTRIC POWER: Although Manchuria now has the two largest hydro-electric installations in the Far East, they account for less than one-third of the country's total generating capacity, the balance of which is concentrated in a few large steam plants in the principal industrial districts. A recently completed network permits interchange of power between the principal industrial areas, but there are one or two important cases of specialized power supply.

The largest concentration of capacity in Manchuria is at Fushun **TARGET 35**, where approximately 330,000 KW are generated by three adjacent steam plants. Some of this feeds into the general network, but an undetermined proportion is direct current on which operations at the adjacent open-cut mines depend. A sizable steam power plant **TARGET 39** also is located at the new Fuhsin coal field west of Mukden, which may not yet be connected into the network. There are steam power plants at both Anshan and Penhsihu iron/steel works, but the latter are large consumers of power and also draw upon the network. The only other known steam plants of consequence are at Kanseishi **TARGET 8** and at Dairen **TARGET 27**. There are reports of one other large steam plant, just south of Mukden.

The hydro-electric installations at Suiho **TARGET 56**, approximately 60 miles inland from the mouth of the Yalu, and on the Sungari River near Kirin **TARGET 55** are by far the largest hydro developments in the Far East. As the first installations in the projected large-scale exploitation of Manchuria's water-power resources, these two developments are already providing over 500,000 KW to the Manchurian network. In both cases, the dams impound sufficient water to assure year-round utilization of installed generating capacity. Some of the Suiho capacity feeds into the Korean network, which operates on a different cycle. All of the Sungari energy feeds into the Manchurian network, although it has been reported that the bulk of this power was to be consumed by new light-metal and other industry in the nearby Kirin district. There are no other hydro developments as yet in operation in Manchuria, although considerable additional capacity has been projected.

The principal steam power plants are large installations. Water for steam and cooling is a major problem for the inland plants, and large cooling towers are characteristic plant installations.

HARBOR FACILITIES: Dairen **TARGET 13**, South Manchurian Railway terminus, and several smaller ports afford the Manchurian railroad network alternate points of access to the sea.

The harbor and shipping facilities at Dairen are the finest and most extensive on the north mainland. Berthing space for some 40 deep draft vessels alongside railroad spurs on fine piers, and fast bunkering, make for quick ship turn around time and convoy assembly.

Hulutao **TARGET 172** to the west, is a new development on the Mukden-Tientsin-Peking coastal line.

Yingkou **TARGET 174**, formerly called Newchwang, is an old river port with a 17 foot draft limit.

To the east of Kwangtung Peninsula, the two port developments, Tatung **TARGET 188** and Tashito **TARGET 85** are at the mouth of the Yalu River and connect with nearby Antung on the Mukden-Fusan mainline.

While the deteriorating Japanese shipping position has increased the use of Korean "ferry route" ports, Dairen remains the principal gateway to Manchuria for substantial commodity movements.

IRON AND STEEL: As a result of the accelerated development of the last eight years Manchurian pig iron capacity is now estimated to be close to 3,000,000 metric tons or about 25 per cent of total capacity under Japanese control. There has been similar in-

3454 — 7—Manchuria—7-11-44—First Proof

SUMMARY AND EVALUATION OF MANCHURIA AREAS Nos. 93.1, 2, 3, 4, 5

crease in Manchurian capacity in coke, ingot steel and rolling mill facilities.

The importance of this capacity has been increased by the effects of a deteriorating shipping position upon blast furnace and steel output in Japan Proper, in contrast with the relative accessibility of iron ore and coal for the Manchurian steel works. It is believed that Manchurian capacity is being more fully utilized than in Japan Proper, and that Japan is drawing upon the Manchurian plants for pig iron, ingot steel and possibly rolled steel.

Of the Manchurian capacity, approximately 90 per cent is concentrated in the Showa Works at Anshan **TARGET 29** and the two plants **TARGETS 30 and 171** at Penhsihu. Practically all of the rolling mill capacity is at the Showa plant, rated the second largest integrated iron/steel works in the Japanese system.

Showa's coal for blast furnace coke moves by relatively short rail haul from the extensive Fushun and Penhsihu fields, and also from North China and the Tunghua field. Iron ore is more of a problem. Low-grade ore of some 35 per cent iron content is abundant in the region, but for blast furnace use processing is required in the beneficiating units at both Showa and Penhsihu. It is estimated that these ore-processing units can supply less than 50 per cent of blast furnace capacity requirements, with capacity operations dependent on limited local production of high-grade ore, and 60 per cent ore from the newly developed Tunghua field some 200 rail miles to the east.

The two Penhsihu plants have a combined pig iron capacity of some 700,000 metric tons with no steel/rolling capacity, except for a nominal tonnage of electric steel.

The new plant at Erhtaokou **TARGET 57** scheduled for 1941-1942 completion in the Tunghua field is part of a general regional development of high grade iron ores and coking coal.

NON-FERROUS METALS: In an area of large undeveloped natural resources, the exploitation of the extensive deposits of aluminous shales, magnesite, and lead and zinc ores was a basic part of the long-range Japanese plan for a self-sufficient Inner Zone within a Greater East Asia Empire. An extensive program was instituted for the construction of alumina, aluminum, and magnesium plants, and lead and zinc smelters. This program was dependent, in part, on the progressive completion of various units in the great hydro-electric project, upon technological progress in the case of aluminum, and upon the realization of increased lead and zinc mine production. Some capacity is known to have been constructed and put into operation by 1940-1941. Information as to the extent to which the plant program has been carried on since then, the units completed, plans for expansion, actual production, and in many instances the exact plant locations, is scanty, vague and often contradictory.

Aluminum: Large-scale production of aluminum from aluminous shales, to avoid dependence upon distant bauxite sources, has been one of the most publicized Japanese projects for Manchuria. There have been many Japanese-language reports of success with this program. On the other hand, the technological difficulties are considerable, and are emphasized by U. S. trade sources. Estimates of aluminum output from Manchurian and Korean shales have ranged from a few thousand tons to as much as 75,000 tons per year, compared with approximately 100,000 tons from bauxite.

The Manchuria Light Metals Co, Fushun Plant **TARGET 32** is the only known installation in Manchuria with facilities for transforming shale to finished aluminum. It includes the only alumina plant in the country and the larger of the two on the Asiatic Mainland. The large magnesium plant of this company is believed to be located in the same area. There have been estimates that this plant accounts for approximately 48,000 tons of Inner Zone alumina capacity, or 12 per cent of Japanese capacity; 18,000 metric tons of aluminum or 9 per cent; 2000 metric tons or 10 per cent of magnesium capacity.

There are conflicting reports concerning an aluminum plant or plants somewhere between Shingishu and Tashito at the mouth of the Yalu River on the Korean side. It is reported that the Oriental Light Metals Co. (Toyo Keikinzoku KK) has installed a plant in the vicinity of Yoshi, five miles southeast of Shingishu. In 1941 it was reported in operation with an annual capacity of 7500 tons. A reported expansion in 1943 would give this plant a capacity of 18,000 tons or approximately 9 per cent of Inner Zone capacity. Alumina was to be brought from Miike, Japan.

The Manchuria Light Metals Co. began the construction of an aluminum plant between Antung and Tatung at the mouth of the Yalu River on the Manchurian shore. Materials shortage halted work in 1940. In 1943 it was reported that construction was resumed with operations to begin in 1944. Capacity by 1945 was to be 20,000 tons.

The Manchuria Light Metals Co. also planned to build an aluminum plant at Kirin to utilize power from the Sungari River hydro-electric project. Planned capacity was to be 16,000 tons. There is no evidence that this plant was constructed.

Magnesium: The largest magnesium plant in Manchuria, and probably the third in the Inner Zone has been described as a part of the Manchuria Light Metals Co, Fushun Plant **TARGET 32.** The plant of the Manchuria Magnesium Industry Co, **TARGET 34** was reputed to have begun operations at Yingkou in 1941 with a capacity of 1000 tons. Additional construction was reported in progress in 1943. The operation of both plants is based on the use of magnesite ores. Magnesia for the Yingkou plant is reportedly supplied from a number of small kilns in the vicinity of Tashihchiao approximately 15 miles east on the Dairen-Mukden RR line.

Lead and Zinc: The large, modern Hulutao (Koroto) Lead and Zinc Smelter **TARGET 187** was put into operation in 1941 by the Manshu Lead Mining Co. In 1943 the capacity was estimated to be 12,600 tons of low

3454 -30-8—Manchuria - 7-11-44—First Proof

SUMMARY AND EVALUATION OF MANCHURIA AREAS Nos. 93.1, 2, 3, 4, 5

grade zinc, approximately 15 per cent of Inner Zone capacity, and 7000 tons of lead, approximately 10 per cent of Inner Zone capacity. Ore is brought from the Yokajashi mines approximately 30 miles northeast of the smelter.

It was reported in 1943 that a smelter at Anshan was operating with a capacity of 7000 tons of lead.

PETROLEUM: It is estimated that at least 50% of Japan's Inner Zone production of oil from all sources is provided by the shale and synthetic oil plants in Manchuria. Inner Zone capacity has been overshadowed by NEI production, but its importance would be correspondingly increased by denial to Japan of NEI crude oil and refined products.

By far the largest Manchurian oil plant, and one of the larger oil installations in the entire Far East, is the South Manchuria Railway shale oil plant at Fushun **TARGET 40** which processes the oil-bearing shale overlying the region's great coal deposits. The plant began operations in 1930, has been progressively extended, and is now estimated to be producing around 2,000,000 barrels a year. This output would be less than 5% of the total that has been under Japanese control, but is 10 per cent of all Inner Zone capacity. It is not known whether the refining capacity at the plant is capable of processing the entire oil output.

Another 20 to 25 per cent of Inner Zone oil production, including around one-third of Inner Zone aviation fuel supply, is credited to coal liquefaction, hydrogenation and low-temperature carbonization plants — so-called synthetic oil production — also located in southern Manchuria. Synthetic oil production has been among the Manchurian possibilities which have been most widely publicized by the Japanese. However, such production involves more complex technological considerations than does the extraction of oil from shale. Reports of synthetic oil plant expansion and capacities in Manchuria are correspondingly subject to reservation, and to check by reconnaissance and spot intelligence.

Among the synthetic plants, the largest is reported to be the Kirin Artificial Oil plant **TARGET 58,** which some estimates give annual output of around 1,800,000 barrels. The SMR Coal Liquefaction plant **TARGET 41** at Fushun, the Manchuria Coal Liquefaction plant at Ssupingkai **TARGET 43,** Manchuria Synthetic Fuel at Chinchow **TARGET 175,** and a Fischer-Tropsch plant in the Showa Steel Works **TARGET 29** at Anshan are smaller installations. At various of these plants, several processes and types of equipment may be found.

It is not known how much capacity exists at these plants for refining their output. It is reported that the cracking unit at the shale plant was to be doubled in size (possibly in part through transfer of equipment from Japan), which would provide refining for the estimated full capacity.

It is possible that considerable of the synthetic/shale plant output may be shipped to the Manchurian Petroleum Refinery at Kanseishi **TARGET 1,** on the north side of Dairen Bay. With the possible exception of expanded refining capacity at the Fushun shale plant, this is the largest refinery in Manchuria and sixth largest in the Inner Zone, including aviation fuel and lubes in output. Manchurian oil also could be sent to Japan Proper refineries, depending on the availability of land/sea transport facilities.

Analysis of the critical points of the oil-from-coal plants is complicated by the considerable process and plant flexibility and overlap. Connected steam plants are important. The principal unit at the shale plant is the installation where the shale is "cooked" under temperature and pressure. Vital units in the synthetic plants are the "stalls" where the basic reaction of hydrogen with the raw material takes place, and the units where hydrogen is obtained from gas which may or may not be produced at the site. Primary distillation units at the plants are comparable to such basic equipment at typical crude oil refineries.

TRANSPORTATION: One of Japan's major achievements in Manchuria is a well-engineered, standard-gauge, high-capacity, railroad network.

With the old South Manchurian and Chinese Eastern systems as a basis, the Japanese have pushed rail construction ever since their occupation of Manchuria. Owing to strategic considerations, the network has been extended much more than is required to handle present traffic. Parallel lines both north-south and east-west have been constructed to provide maximum flexibility of military operations. In addition, the lines themselves have in many cases been constructed to higher standards than justified by existing traffic. A number of the new lines serve to connect the main ports of Manchuria and Korea directly with the industrial and military centers of Manchuria.

The most important long-haul commodity movements are a flow of military supplies and other manufactured goods from the ports of Korea and Manchuria to Central and North Manchuria; a southbound movement of soybeans, wheat and other agricultural products from the north to the southern cities and to the ports for shipment to Japan, with a pronounced seasonal peak in the winter; and outbound movements of pig iron, iron and other ores, and other raw materials. The most important short-haul movements — constituting the bulk of the total tonnage moved — consist of coal, iron ore and related raw materials for the steel industry at Anshan and Penhsihu.

A large part of the traffic of the entire system is handled on the main north-south double-track line from Dairen through Mukden and Hsinking to Harbin. The heaviest traffic is the immediate Mukden region, where the congestion is so great as to constitute a serious weakness of the system. The heavy flow of agricultural products southbound, and of military supplies northbound, are combined with movement of materials to and from the Anshan Steel Works estimated at more than 10 million tons a year. Coal from Fushun, moving over a double-track line

3654—9—Manchuria—12-11-44—First Proof

SUMMARY AND EVALUATION OF MANCHURIA AREAS Nos. 93.1, 2, 3, 4, 5

to Suchiatun (10 miles south of Mukden) or over a new line via Penhsihu, is the principal item. Most of the iron ore originates in mines adjacent to Anshan and Penhsihu, although some may come from mines near Tunghua, to the east. In addition, the railroad northwest from Peking and Shanhaikwan (on which double tracking is reported in progress) joins the main line at Mukden. Coal from the Kailan mines in north China, which is being moved to Japan via Fusan because of shortage of shipping, can avoid Mukden only if there is a bridge over the Liao River at Yingkou, the existence of which would provide a lateral cut-off. This has been an important line for movement of troops and material for China operations. The center of activity in the Mukden region is at Suchiatun Junction, where the line to Antung and Fusan leaves the Dairen line. The Suchiatun freight yards are included in **TARGET 173.** Other important targets in the general Mukden region are the main freight yards at Mukden **TARGET 53,** the largest in Manchuria, and the long multi-span bridges over the Hun and Taishi Rivers **TARGETS 367 and 368** between Mukden and Anshan.

Dairen is the southern terminus of this main north-south line. The extensive terminal yards there are included in **TARGET 13.** At the north end of the line, Harbin is the center of military activity and the concentration point for southbound agricultural shipments. Important railroad installations are the freight yards **TARGET 91** and two bridges over the Sungari River **TARGETS 92 and 113.**

In the north there are two parallel lateral routes. The more southern runs from Halun Arshan in the west through Hsinking and Kirin to Tumen. Double tracking is reported under construction east of Hsinking. The other is the old Chinese Eastern line from Manchouli in the west through Tsitsihar and Harbin to Suifenho on the border of the Maritime Provinces. There are military feeder lines north to Heiho, Lopei, Chiamussu, and Hutou. The centers of activity in this northern network aside from Harbin are the freight yards at Tsitsihar in the west **TARGET 155** and those at Mutanchiang in the east **TARGET 366.** Part of the southbound movement of coal from Mishan is handled at the latter.

Movement between the Korean ports of Seishin and Rashin and the interior of Manchuria is over the lines that converge at Tumen from Hsinking, Harbin and Mutanchiang, with the bridge over the Tumen River (**TARGET 19,** 84.1, Seishin Area), a controlling point. Farther south, there is considerable traffic on the line, now being double-tracked, between the Mukden region and the Korean ports, principally Fusan. At Antung, there are two long bridges over the Yalu River **TARGET 77,** and freight yards **TARGET 72.**

Between these two major routes to the seacoast, there is an alternate from Ssupingkai through Tunghua to Chian. There are conflicting reports as to whether a bridge or a tunnel has recently been constructed to carry this line across the Yalu River between Chian and Mampochin (Korea).

Although the lines in Manchuria, with the exception of the immediate Mukden region, exceed required capacity, there is a serious shortage of rolling stock, brought about in part by transfers of equipment to north China. It is believed that utilization of the freight car supply is being pushed to the limit to handle the present estimated annual traffic of some 85 million tons, increasing the importance of concentrations of cars in marshalling and industrial freight yards, repair facilities, and rolling stock manufacturing plants. Of the 12 known railroad repair shops in Manchuria, by far the largest and most important are the SMR Shakako shops in Dairen **TARGET 16.** The Harbin shops **TARGET 114** also are important. Other major shops are located at Mukden **TARGET 178,** at Suchiatun **TARGET 173,** and at Tsitsihar **TARGET 155.** The remaining seven shops are smaller and primarily of local importance.

The Shakako Shops are also the largest builder of railway equipment in Manchuria. Other important plants are those of the Mukden Arsenal **TARGET 46,** plants of the Sumitomo Metal Works in Mukden **TARGET 50** and Anshan, and the Dairen Machinery Company **TARGET 17.**

An extensive highway network has been constructed by the Japanese between the principal centers, but rail transport is essential for traffic consisting principally of long-haul bulk materials. Inland waterway traffic, with the exception of the Liao River south of Mukden, is limited to the Sungari, Ussuri, and Amur Rivers, which are in outlying agricultural regions and are navigable only from May to October.

INCENDIARY ATTACK: While there are crowded older sections, the large industrial cities in Manchuria are of relatively modern lay-out and construction. They are not considered to have the inflammable characteristics of comparable cities in Japan proper.

3654—10—Manchuria—12-11-44—First Proof

CONFIDENTIAL equals British Confidential

Air Objective Folder

DAIREN REGION

MANCHURIA AREAS, Nos. 93.1, 2, 3, 4, 5

INDEX OF TARGETS BY NUMBER, CLASSIFICATION AND NAME

Target, Number	Name	Text Page
	BUILDING MATERIALS	
54	Onoda Cement Works	30
	CHEMICALS	
19	Manchurian Chemical Industry	25
20	Manchuria Soda Co.	25
184	South Manchurian Railway Central Laboratory	21
	COAL AND COKE	
15	Kanseishi Coal Pier	27
	ELECTRIC POWER	
8	Kanseishi Steam Power Plant	25
27	Amanagawa Steam Power Plant	22
	HARBOR FACILITIES	
13	Dairen Piers	16
	MACHINES AND MACHINE TOOLS	
17	Dairen Machinery Co.	22
	NAVAL BASES	
11	Naval Dockyard	29
	PETROLEUM	
1	Manchuria Petroleum Co.	26
6	Naval Oil Storage	29
197	Jijoko Oil Storage Area	17
	SHIPBUILDING	
10	Manchuria Dockyard Co.	21
	TRANSPORTATION	
16	South Manchurian Railway Workshops	23

Summary and Evaluation of Dairen Region

Dairen, the finest mainland port development north of Shanghai, is the terminus of the double-tracked mainline through Mukden to Harbin, the railroad hub of the north. There is a single-tracked line to Port Arthur 25 miles to the southwest and the coastal line single-tracked and now operating to Chengtzuan is reported being extended via Tatung **TARGET 188** to join the Mukden-Korea mainline at Antung.

Dairen is a deepwater port and has berthing space for some forty-two vessels, is well sheltered by a breakwater and practically ice-free in winter. It is the only Japanese controlled mainland port north of Tsingtao capable of handling with dispatch any sizable convoy. There are four modern piers of the reclaimed land type with ferro-concrete and brick freight sheds. Railroad spurs serve the freight sheds and permit ship-to-railroad-car transshipment. Some mechanical loading equipment is in use.

The east entrance to the breakwater is normally used; only light draft vessels would attempt to make open water through the west entrance. There are good approaches to the Inner Harbor and vessels could make the open sea through any passages to the east.

The bay affords anchorage sheltered from all winds except those from southeast to northeast but the bottom is soft mud and bad holding ground for anchors. Ships if anchored outside can be expected northeast of the east entrance to the Inner Harbor.

The Kanseishi Coal Pier **TARGET 15**, two miles NNW of the pier area, is the largest mainland coal loading and the fastest bunkering installation north of Hongai in Indo China.

The Dairen city area, largely urbanized lowland, extends approximately six miles along the south shore of Dairen Bay. Two miles wide (north to south) in the west sector, the district narrows gradually to a point east of the city where the encircling hills reach the coast. This area divides into four districts: (east to west) the Jijiko, Dairen city, Shoko, and Shakako districts.

The Jijiko district, lying east of the Dairen Pier No. 1, is the oil storage and soybean mill section of Dairen. Both bean oil and petroleum products are stored in tanks which closely resemble each other. There are believed to be at least 16 large tanks and numerous small tanks and warehouses with a capacity of about 500,000 barrels in the Jijiko Oil Storage Area **TARGET 197**. The soybean mills and tanks lie adjacent on the west.

The Dairen city district includes the four large Dairen Piers **TARGET 13** and most of the extensive harbor and warehouse facilities. The Manchuria Dockyard Co. **TARGET 10** located just southwest of pier No. 4, although of relatively small size, is the largest and most complete yard north of Shanghai. Recently enlarged, it is equipped to handle ships to 10,000 tons, and to build and repair ships' engines. There has been much activity reported in connection with the wooden shipbuilding program.

The South Manchurian Railway Central Laboratory **TARGET 184**, the only listed target in the Shoko district, is the most important industrial research center in the Far East.

There are four listed objectives in the Shakako district: The South Manchurian Railway Workshops

CONFIDENTIAL equals British Confidential

3454 Manchuria ZIP-44 First Proof

SUMMARY AND EVALUATION OF DAIREN REGION, MANCHURIA AREAS Nos. 93.1, 2, 3, 4, 5

TARGET 16, the largest and best equipped shops on the Continent; the Dairen Machinery Co. **TARGET 17,** manufacturing railroad rolling stock, machine tools, aircraft parts, and iron and steel products; and the Amanagawa Steam Power Plant **TARGET 27,** the second largest power plant in the Dairen region (which is connected with the Manchurian electric power network).

Throughout the Dairen city area are numerous small plants and other non-target installations. The larger of these are labeled on map on page M-5.

The Kanseishi district is located on the north shore of Dairen Bay on a narrow plain fringed on the north with low hills. It is connected with the Dairen-Mukden mainline railroad by a spur from Chousuitzu four miles to the west. The district has been entirely developed by the Japanese and the exact extent to which it has been built up with new industries is not known.

With the possible exception of the refining capacity of the shale oil plant at Fushun, the Manchuria Petroleum Co. **TARGET 1** at Kanseishi is the largest oil refinery in Manchuria and the sixth largest in the Inner Zone with approximately 5 per cent of the total capacity. It is possible that much of the synthetic/shale oil may be shipped to this plant for refining. A second important installation is the Manchurian Chemical Industry **TARGET 19,** the fifth largest nitrogen fixation plant in the Inner Zone and the largest in Manchuria.

The other targets listed in this concentration are the Kanseishi Coal Pier **TARGET 15;** the Manchuria Soda Co. **TARGET 20,** the only large pre-war soda ash producer in Manchuria; and the Kanseishi Steam Power Plant **TARGET 8,** the largest in the Dairen region. Although this plant supplies power to the industries in Kanseishi, the district is connected with the Manchurian electric network.

Port Arthur (Ryojun), 20 miles southwest of Dairen and on the north side of Chihli Strait, has been developed into a secondary Japanese naval base, and may afford naval/air cover to China coast traffic through the strait.

The harbor is land-locked, with an entrance 900 feet wide but narrowed to about 600 feet by shoal water. Inside there are shallow areas and mudflats, but two anchorages affording 25 to 30 feet may have been extended by dredging.

There are only two targets listed for the Port Arthur section. The naval base **TARGET 11** has two graving docks believed used for underwater repairs and maintenance; building facilities are believed to be limited. Fueling of naval units from the base's storage **TARGET 6** can be expected.

Port Arthur is connected with Dairen by a single tracked railroad but has no industrial importance.

PHOTO 1—Dairen—Airview of Central Circle.

MANCHURIA AREAS NOS. 93.1, 2, 3, 4, 5 SUMMARY (DAIREN REGION)

3654—12-11-44—First Proof

PHOTO 2—Dairen—Airview of Dairen from Central Park, showing TARGET 13 Dairen Wharves and Dairen Hospital.

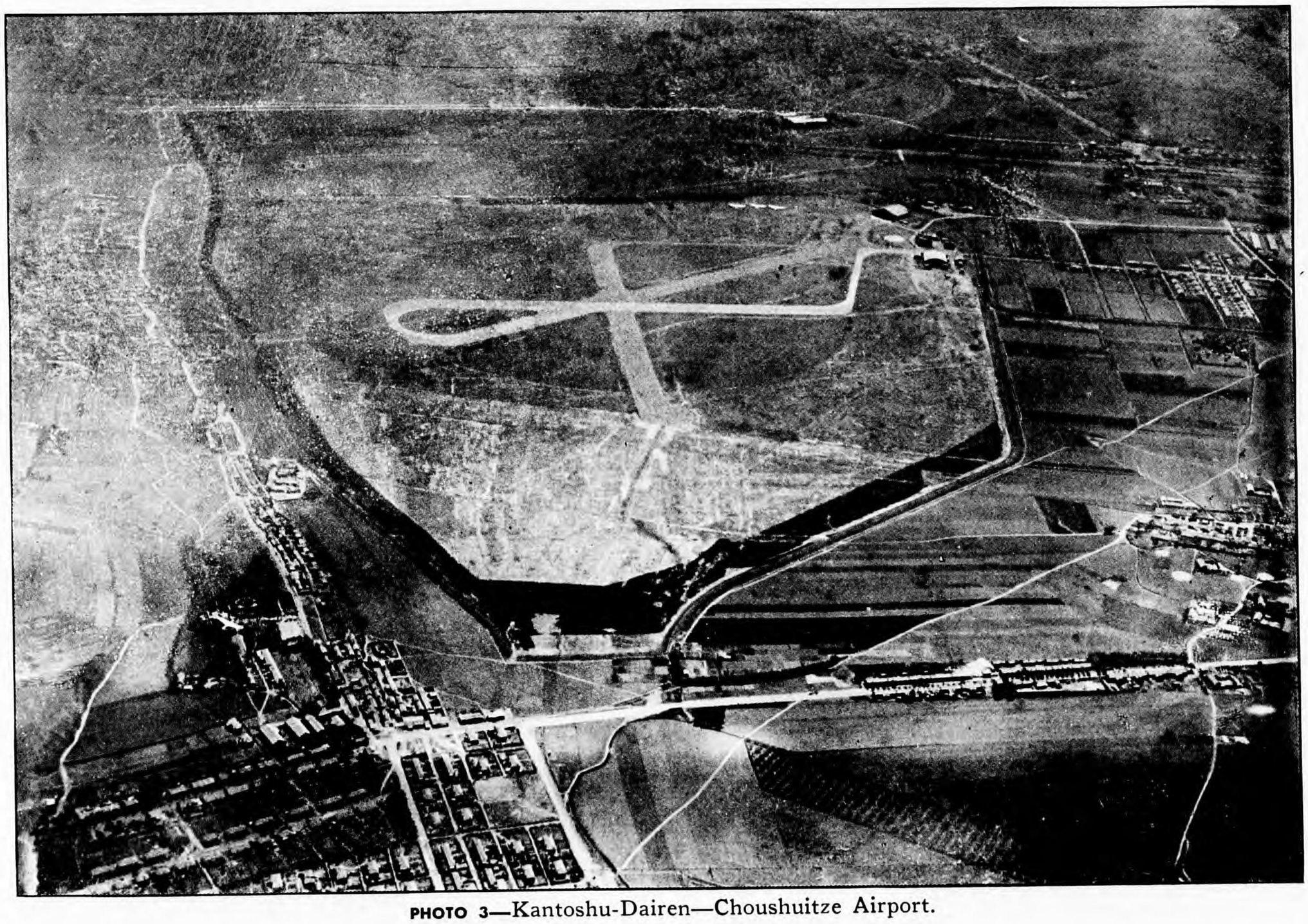


PHOTO 3—Kantoshu-Dairen—Choushuitze Airport.

MANCHURIA AREAS NOS. 93.1, 2, 3, 4, 5 SUMMARY (DAIREN REGION)

3654—13—Manchuria—12-11-44—First Proof

CONFIDENTIAL equals British Confidential

CONFIDENTIAL equals British Confidential

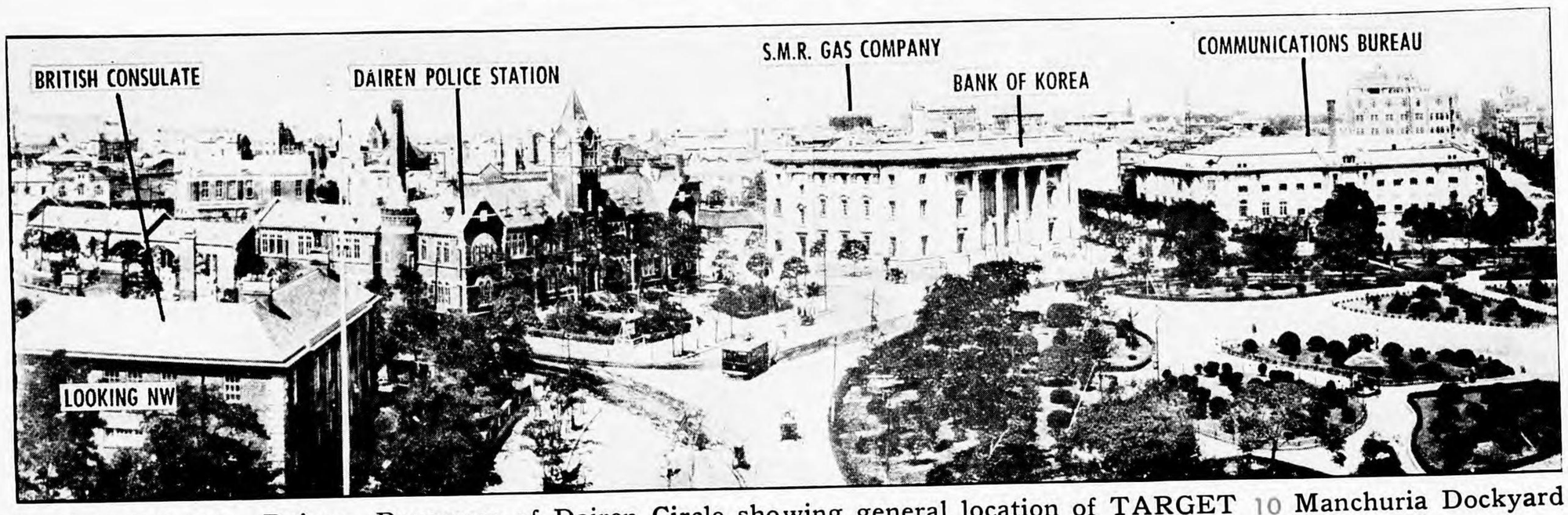


PHOTO 4 (left half)—Dairen—Panorama of Dairen Circle showing general location of TARGET 10 Manchuria Dockyard Co, TARGET 13 Dairen Wharves.

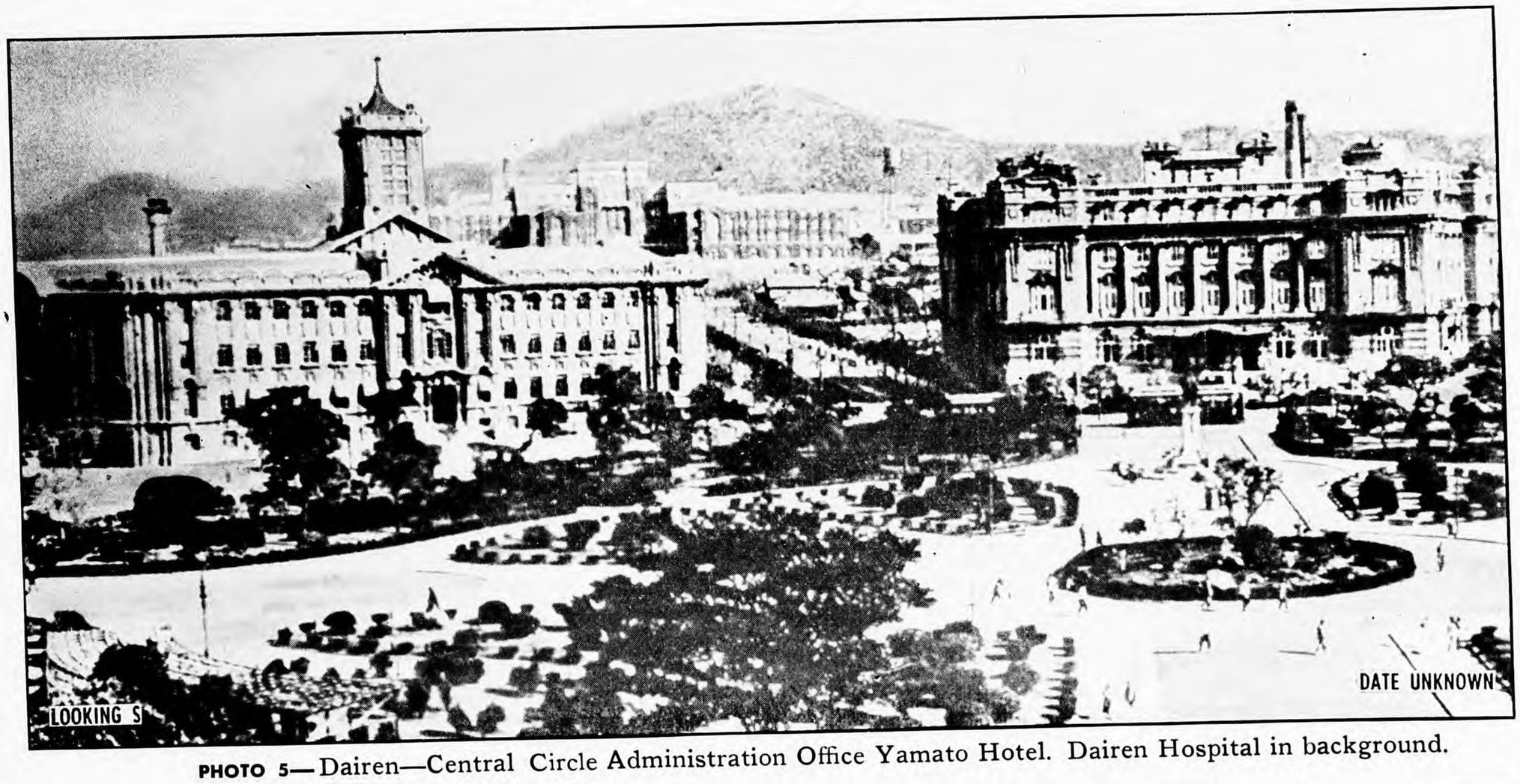


PHOTO 5—Dairen—Central Circle Administration Office Yamato Hotel. Dairen Hospital in background.

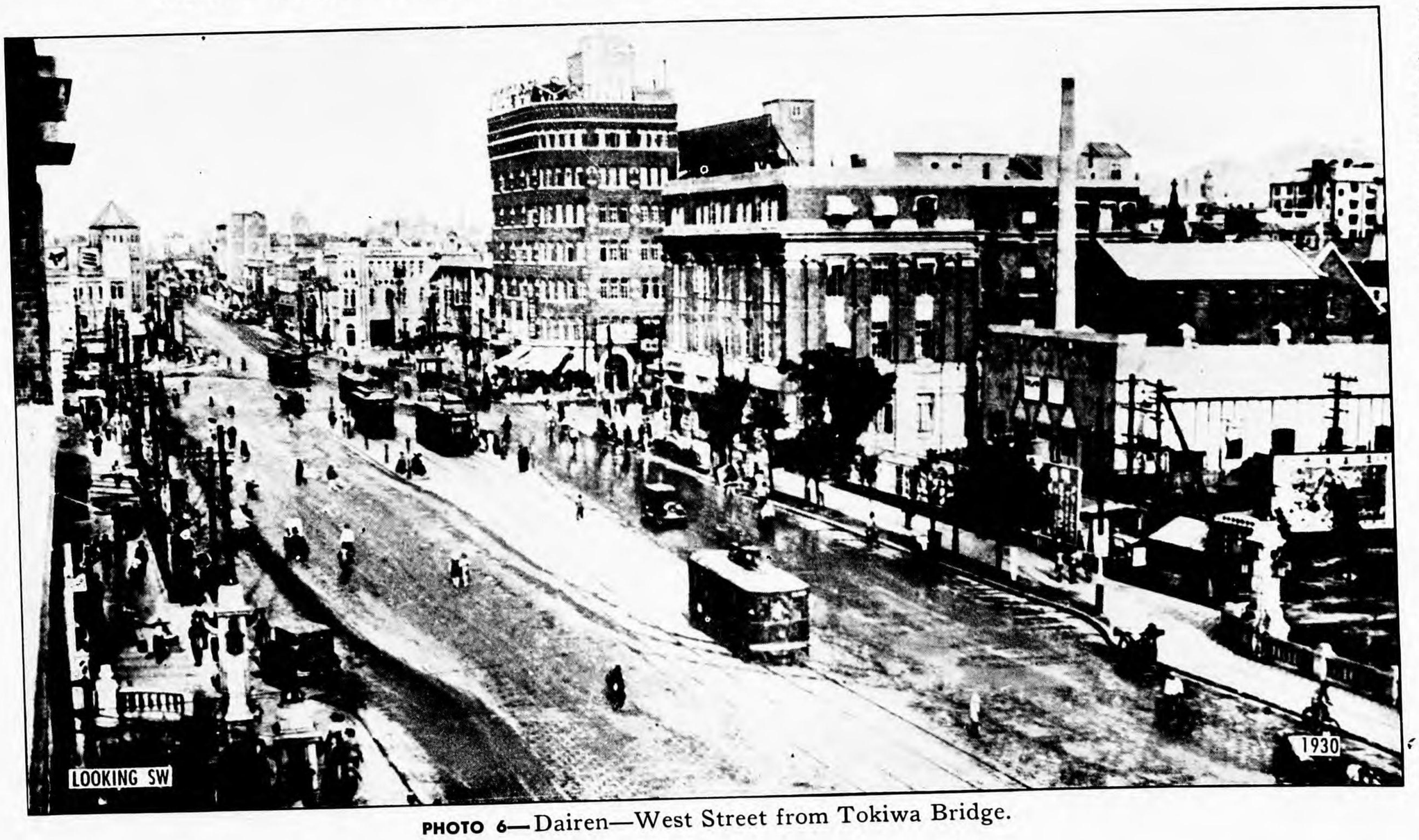


PHOTO 6—Dairen—West Street from Tokiwa Bridge.

MANCHURIA AREAS NOS. 93.1, 2, 3, 4, 5 SUMMARY (DAIREN REGION)

3654—14—Manchuria—12-11-44—First Proof

CONFIDENTIAL equals British Confidential

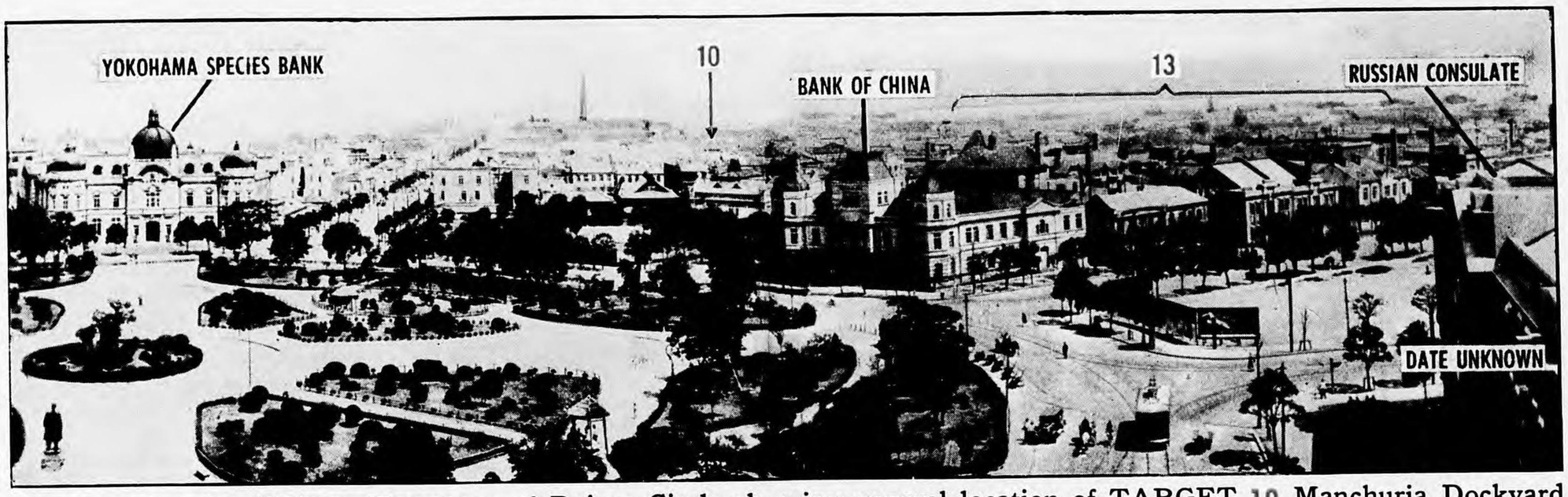


PHOTO 4 (right half)—Dairen—Panorama of Dairen Circle showing general location of TARGET 10 Manchuria Dockyard Co, TARGET 13 Dairen Wharves.

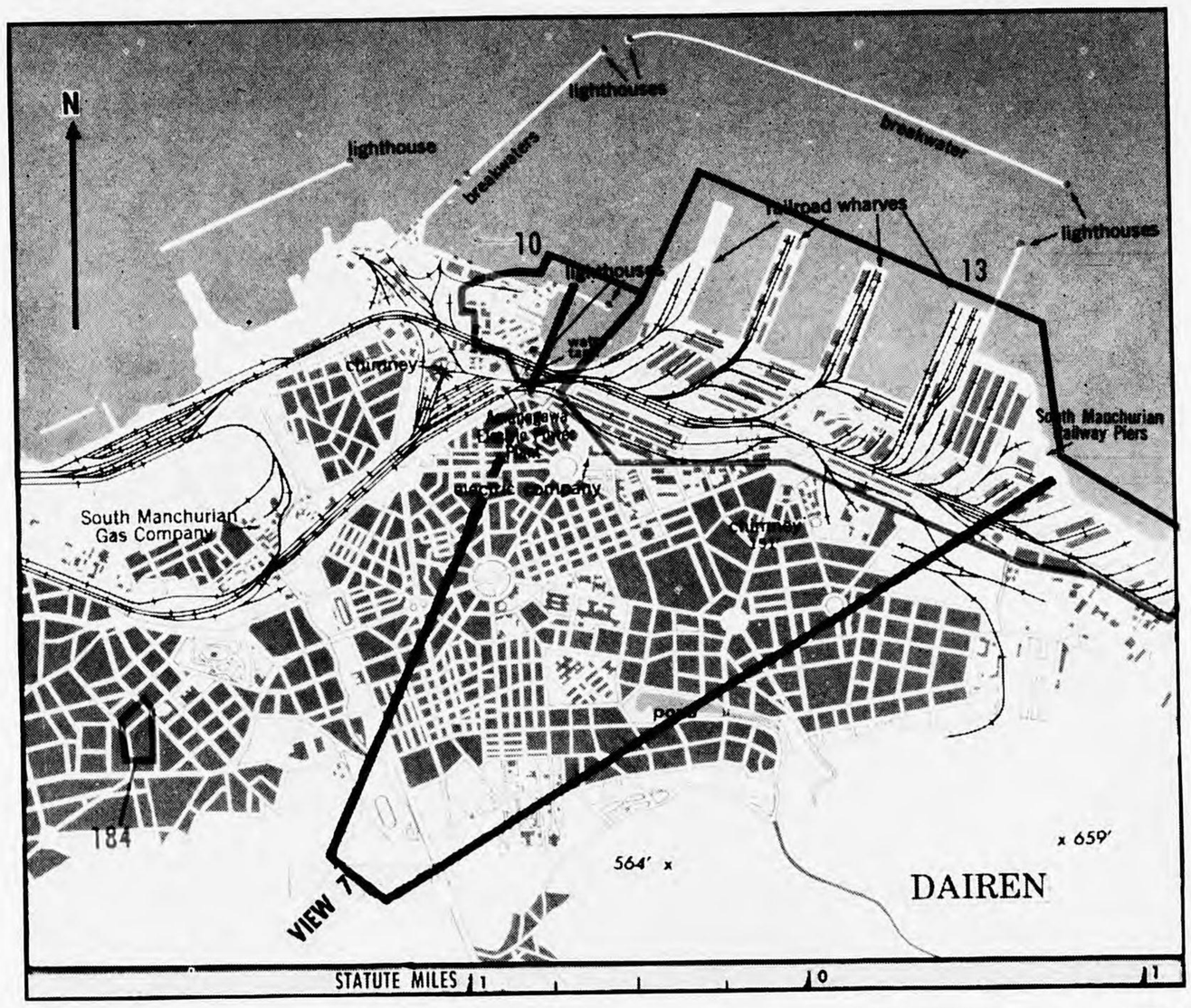


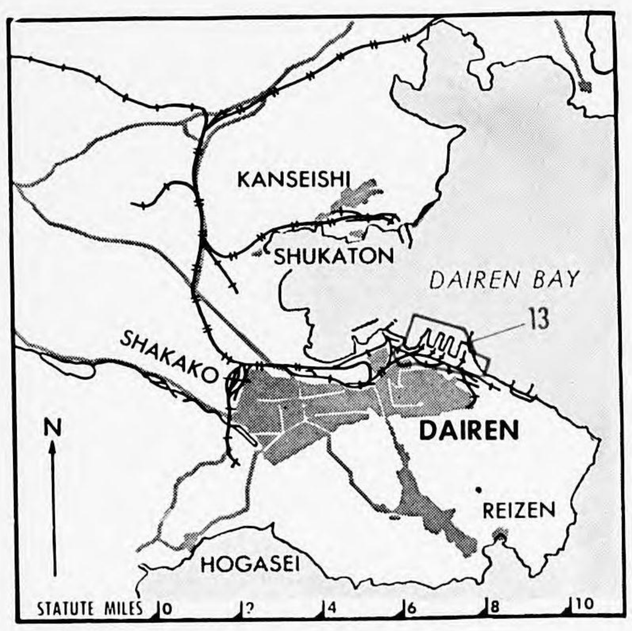
PHOTO 7—Dairen—TARGET 13 Dairen Wharves. Airview from Central Park. For direction of photo note view 7.

CONFIDENTIAL equals British Confidential

MANCHURIA AREAS NOS. 93.1, 2, 3, 4, 5 TARGETS 10, 13 (DAIREN REGION)

3654—15—Manchuria—12-11-44—First Proof

PHOTO 8—Dairen Waterfront TARGET 13 Dairen Wharves.



TARGET 93.5— 13

DAIREN PIERS

DAIREN

(HARBOR FACILITIES)

38° 56′ N 121° 39′ E (Approx)—Breakwater enclosed area. Four piers, measuring approx:

Piers 1 and 4	1950 by 600 ft
Piers 2 and 3	1950 by 375 ft

Piers afford approx 14,500 linear ft for berthing some 42 vessels without crowding. Piers are reclaimed land type, freight sheds are modern ferro-concrete /brick, measuring 540 sq ft. Spurs permit ship-to-rail transhipment. Some mechanical landing equipment is used. (See photos 4, 7, 8, 9 and 10; map on page M-5.)

PHOTO 9—Dairen TARGET 13 Dairen Piers. Wharf Building and head of Pier 2.

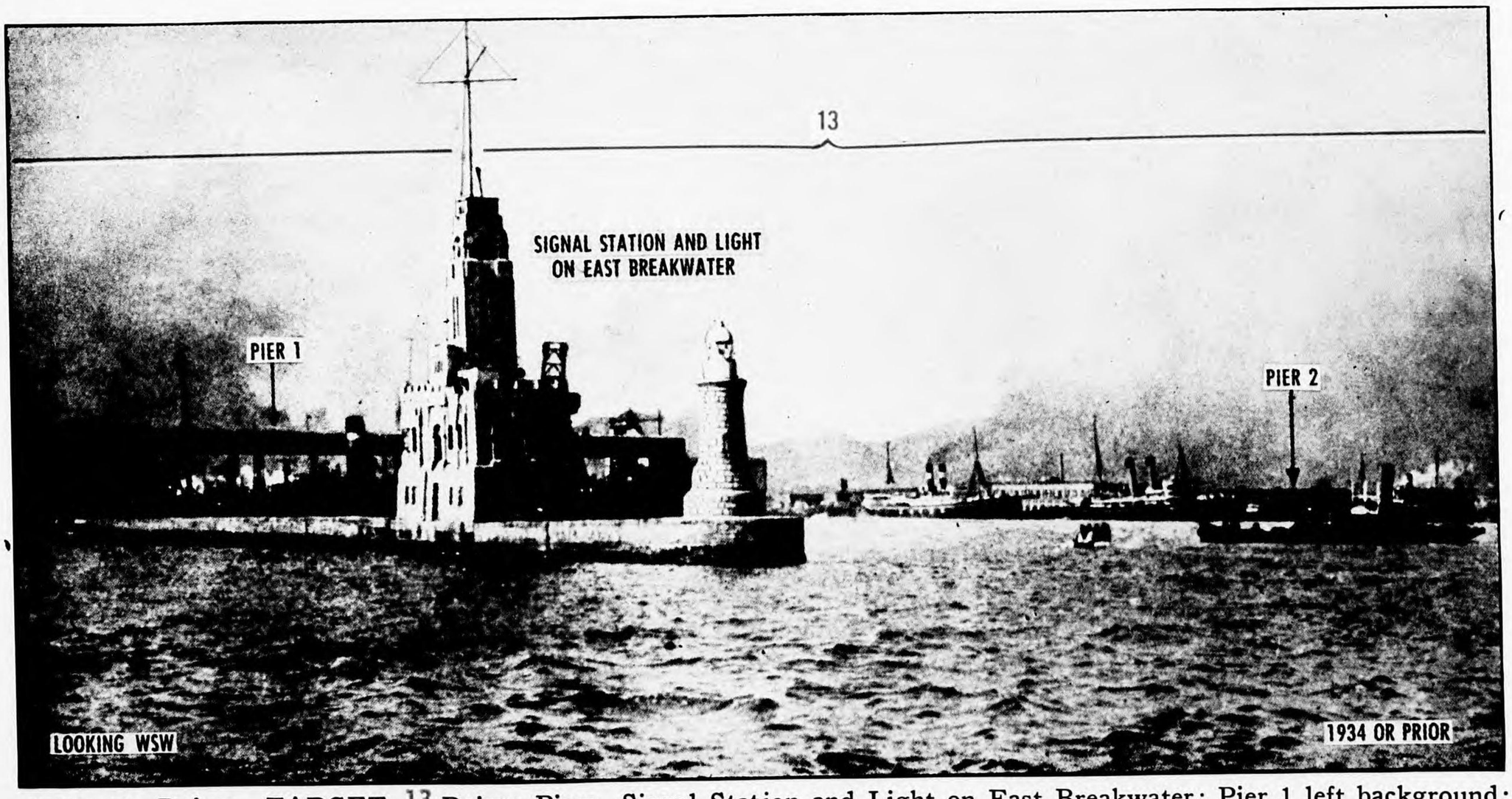


PHOTO 10—Dairen—TARGET 13 Dairen Piers. Signal Station and Light on East Breakwater; Pier 1 left background; Pier 2 right background.

MANCHURIA AREAS NOS. 93.1, 2, 3, 4, 5 TARGET 13 (DAIREN REGION)

3654—16—Manchuria—12-11-44—First Proof

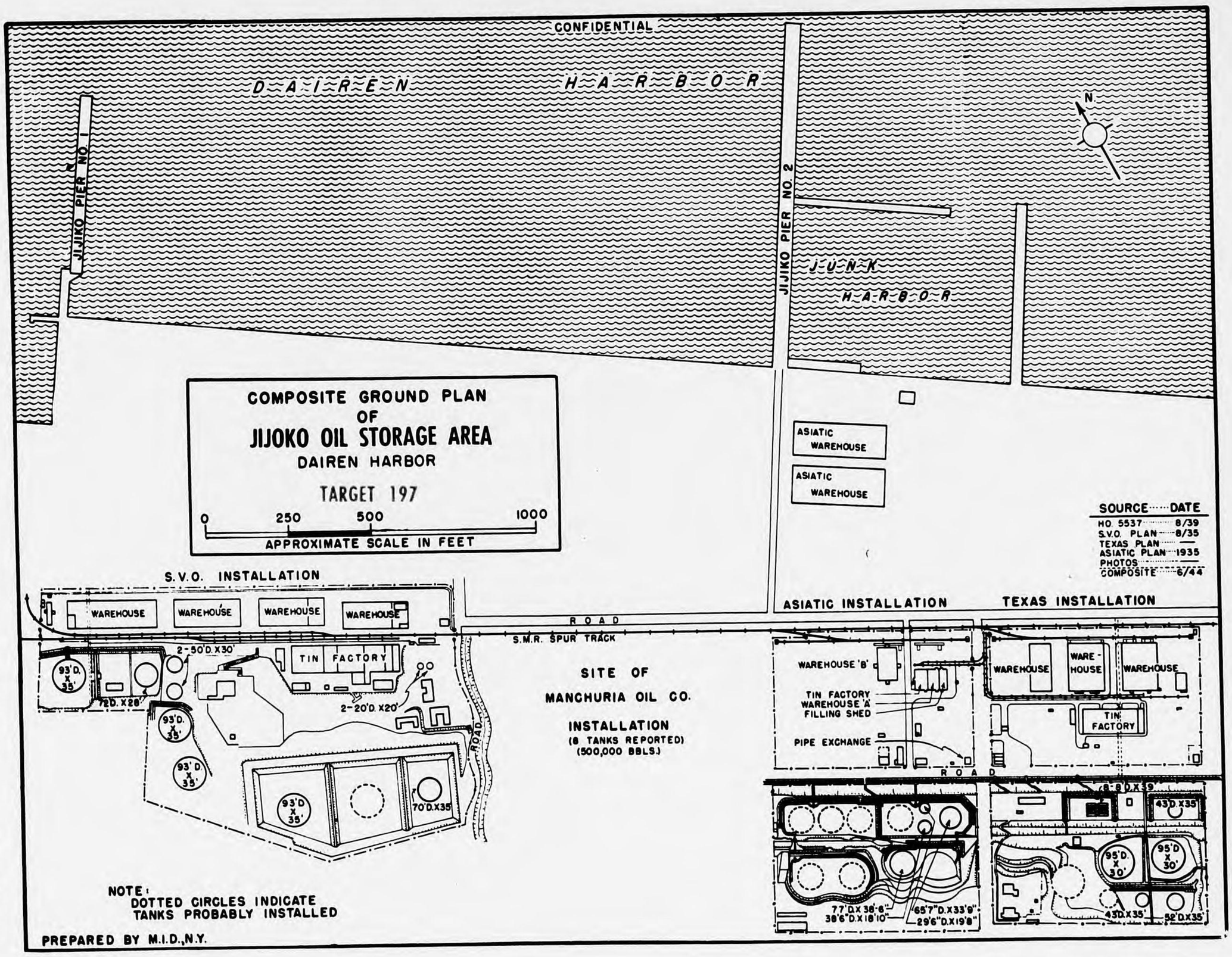


PHOTO 11—Dairen—TARGET 197 Jijiko Oil Storage Area. Jijiko Pier 1 for heavy oils and soybean oil.

TARGET
93.5—
197

JIJOKO OIL STORAGE AREA

DAIREN

(PETROLEUM)

38° 55′ N 121° 41′ E (Approx)—Composed of four storage depots: Standard Vacuum, Manchuria Oil, Asiatic Petroleum, and Texas Companies (W to E). Total area: approx 3500 ft along shore, 1500 ft inland. Total tankage cap approx 500,000 bbls for gasoline, kerosene, fuel, diesel, and lube oils. Numerous whses for can storage, three can factories, pumphouses. Piers: Jijiko No. 1, 1504 ft long with two bean oil pipe lines, other pipe lines for diesel and fuel oils; Jijiko No. 2, longer than No. 1, pipe lines beneath concrete pier for gasoline and kerosene.

(See photos 11, 12, 13 and 14; map on page M-5.)

MANCHURIA AREAS NOS. 93.1, 2, 3, 4, 5 TARGET 197 (DAIREN REGION)

3654—[illegible]—Manchuria—12-11-44—First Proof

MANCHURIA AREAS NOS. 93.1, 2, 3, 4, 5 GENERAL PHOTOS (DAIREN REGION)

CONFIDENTIAL equals British Confidential

PHOTO 12— Dairen—TARGET 197 Jijiko Oil Storage Area; Texas Oil Storage. Jijiko Pier 2, warehouses, quarters, pipelines.

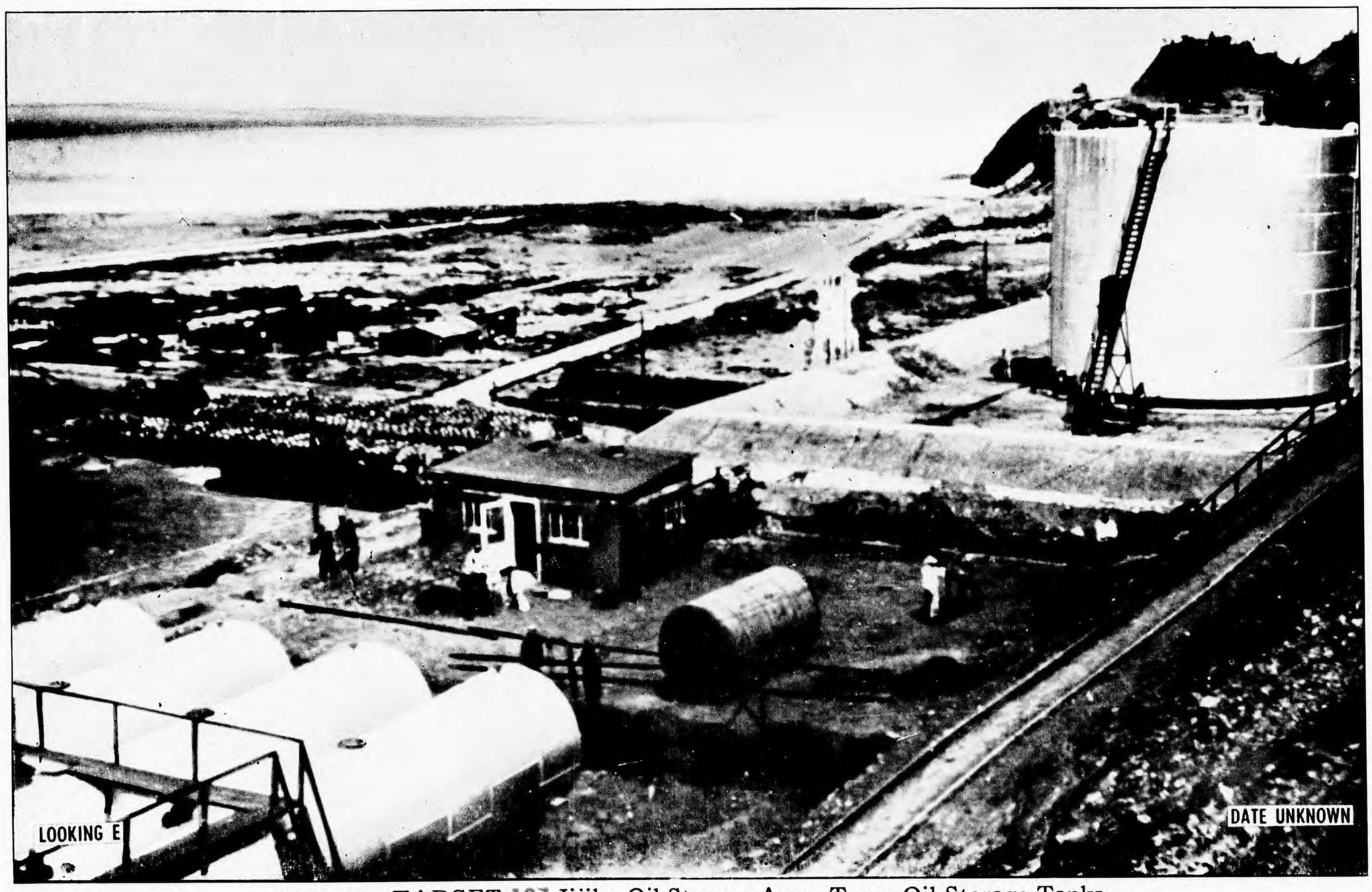


PHOTO 13— TARGET 197 Jijiko Oil Storage Area; Texas Oil Storage Tanks.

MANCHURIA AREAS NOS. 93.1, 2, 3, 4, 5 GENERAL PHOTOS (DAIREN REGION)

CONFIDENTIAL equals British Confidential

3654—18—Manchuria—12-11-44—First Proof

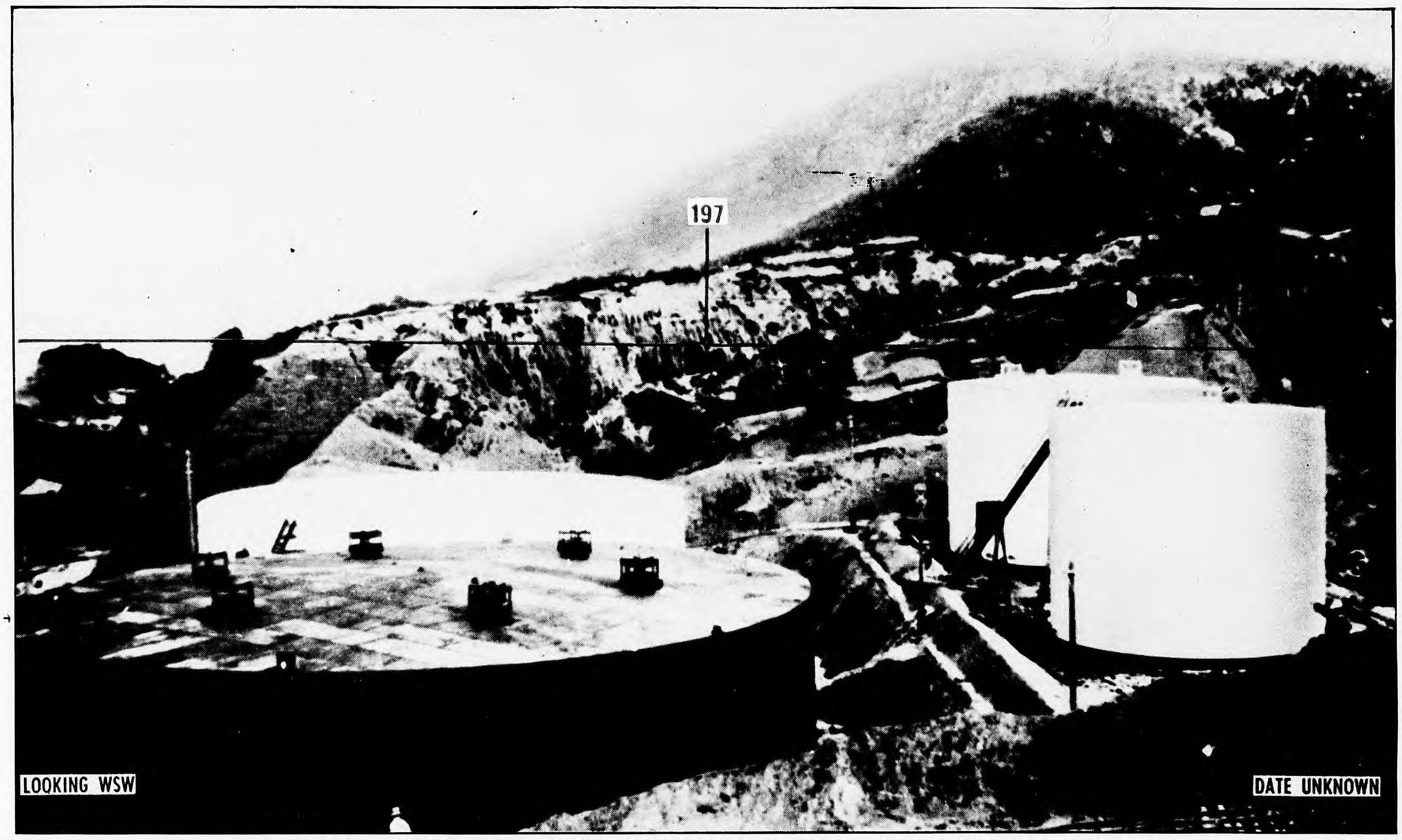


PHOTO 14— Dairen—TARGET 197 Jijiko Storage Area; Texas Oil Storage Tanks.

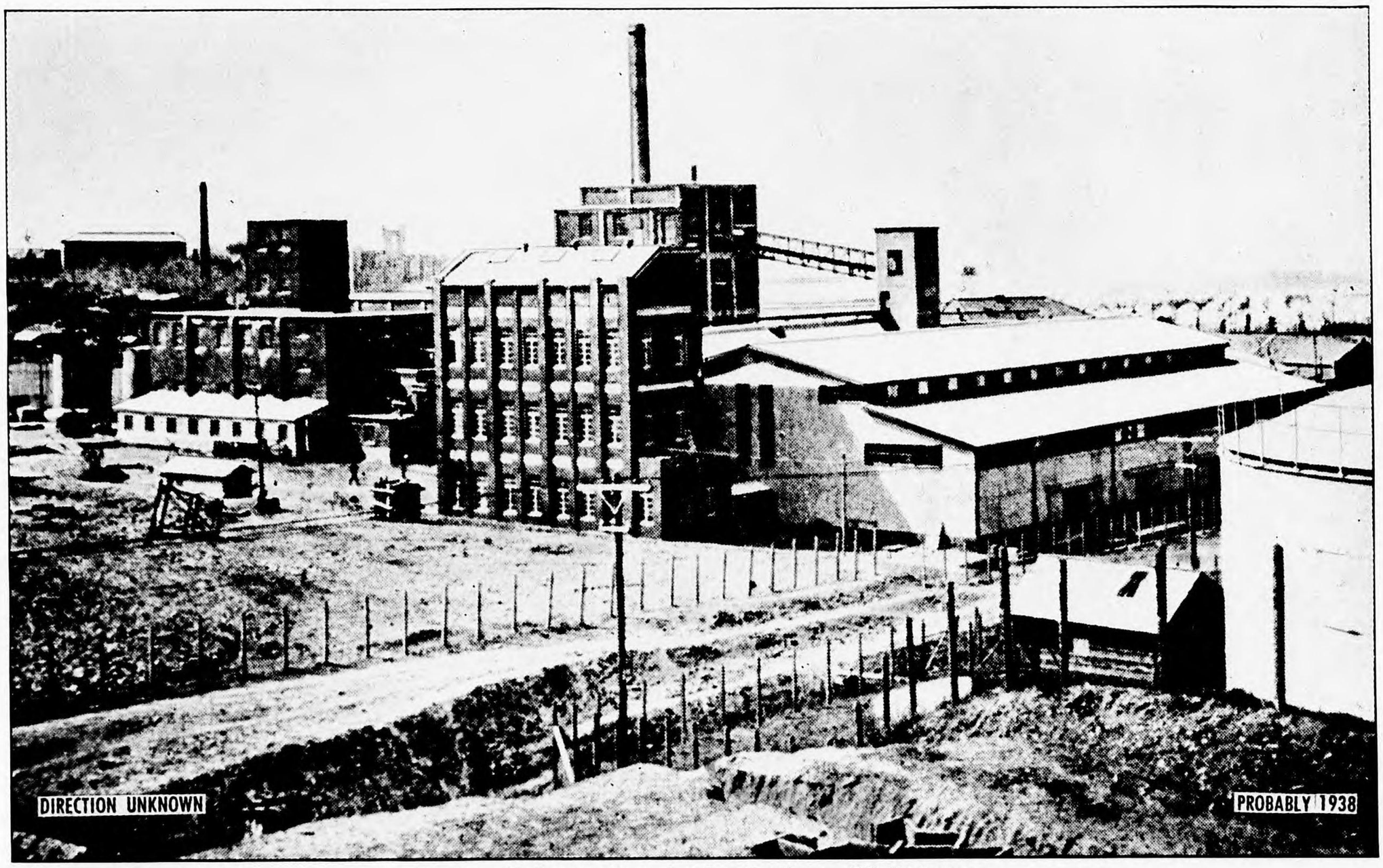


PHOTO 15— Dairen—Manchurian Soybean Oil Industry.

3654—19-12-Manchuria—12-11-44—First Proof

MANCHURIA AREAS NOS. 93.1, 2, 3, 4, 5 GENERAL PHOTOS (DAIREN REGION)

CONFIDENTIAL equals British Confidential

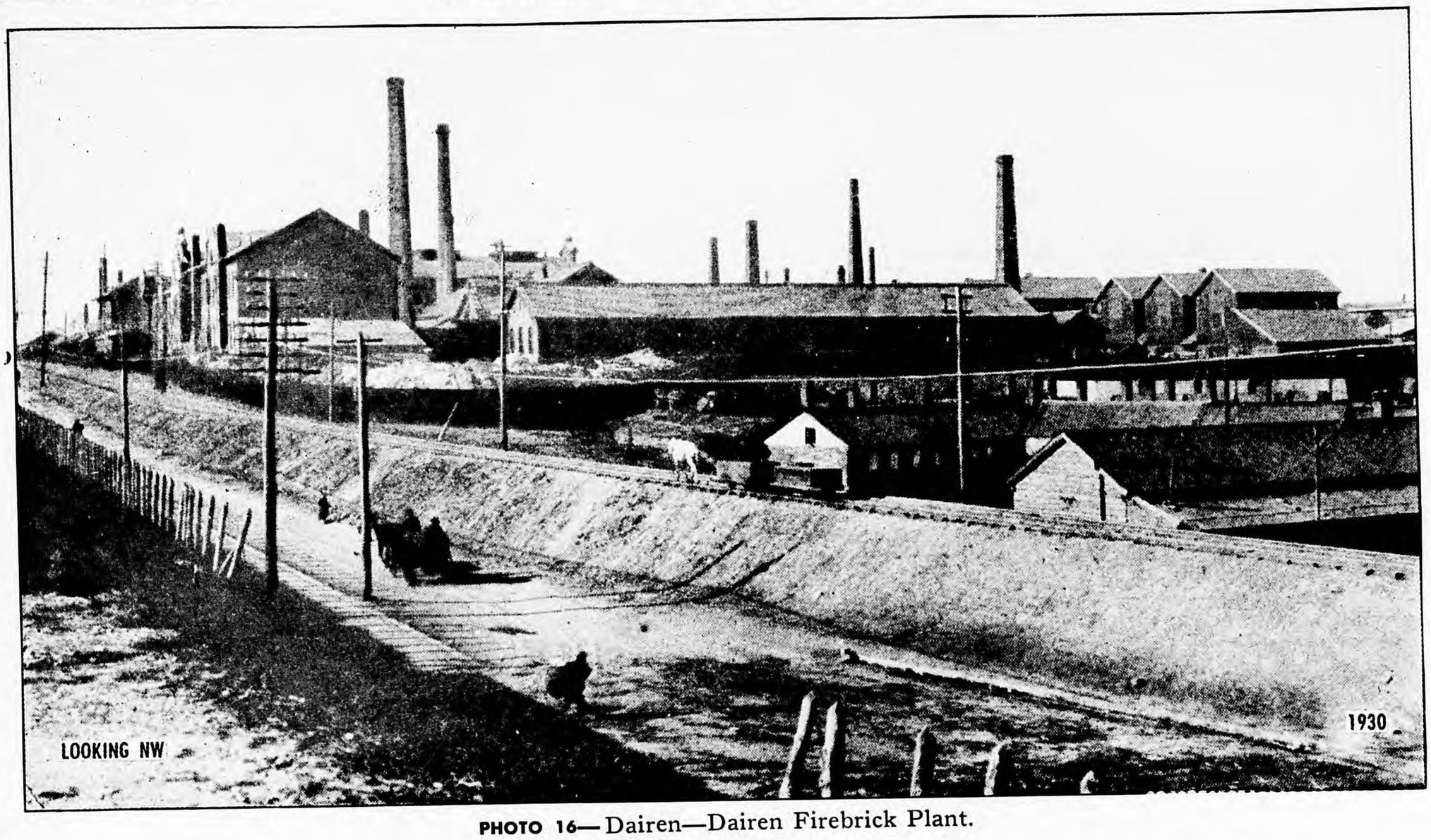


PHOTO 16—Dairen—Dairen Firebrick Plant.

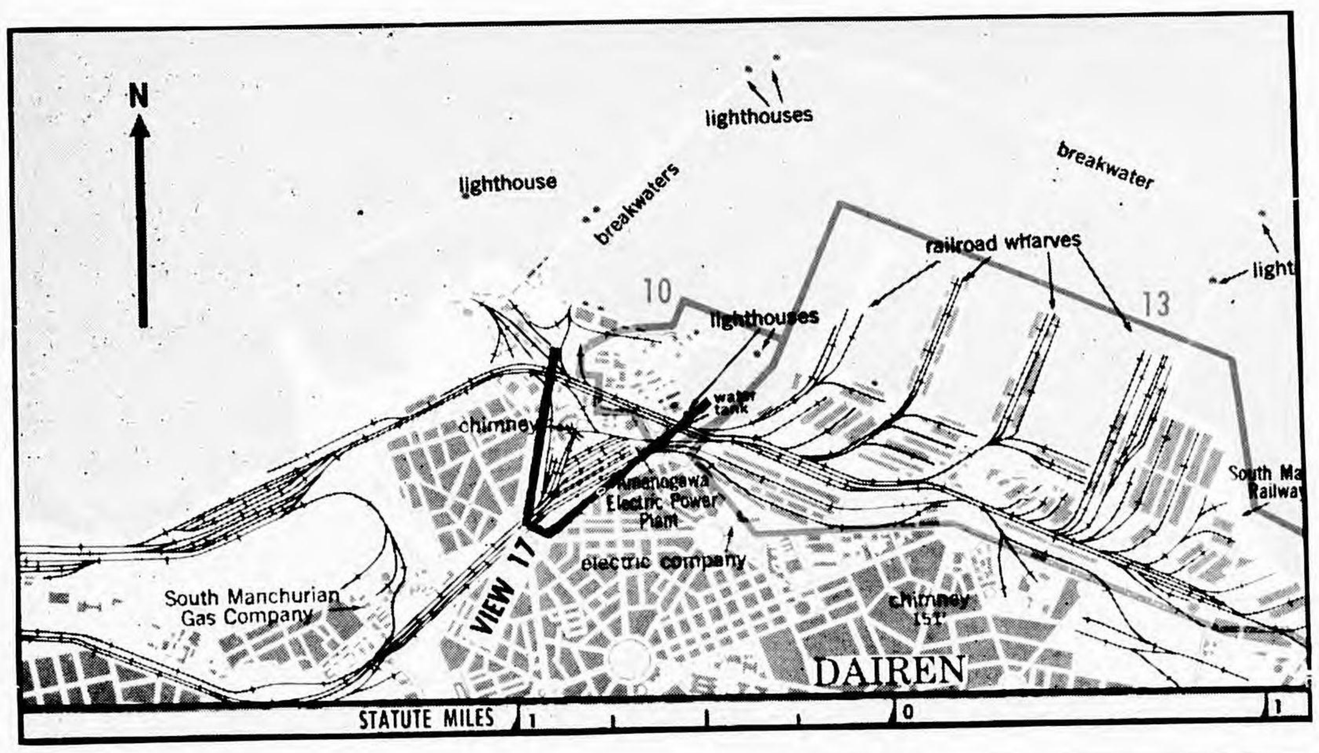


PHOTO 17—Dairen—Dairen Railway Yards and Roundhouses, old Hamacho Steam Power Plant believed dismantled. For direction of photo, note VIEW 17.

CONFIDENTIAL equals British Confidential

MANCHURIA AREAS NOS. 93.1, 2, 3, 4, 5 GENERAL PHOTOS (DAIREN REGION)

3654—20—Manchuria—12-11-44—First Proof

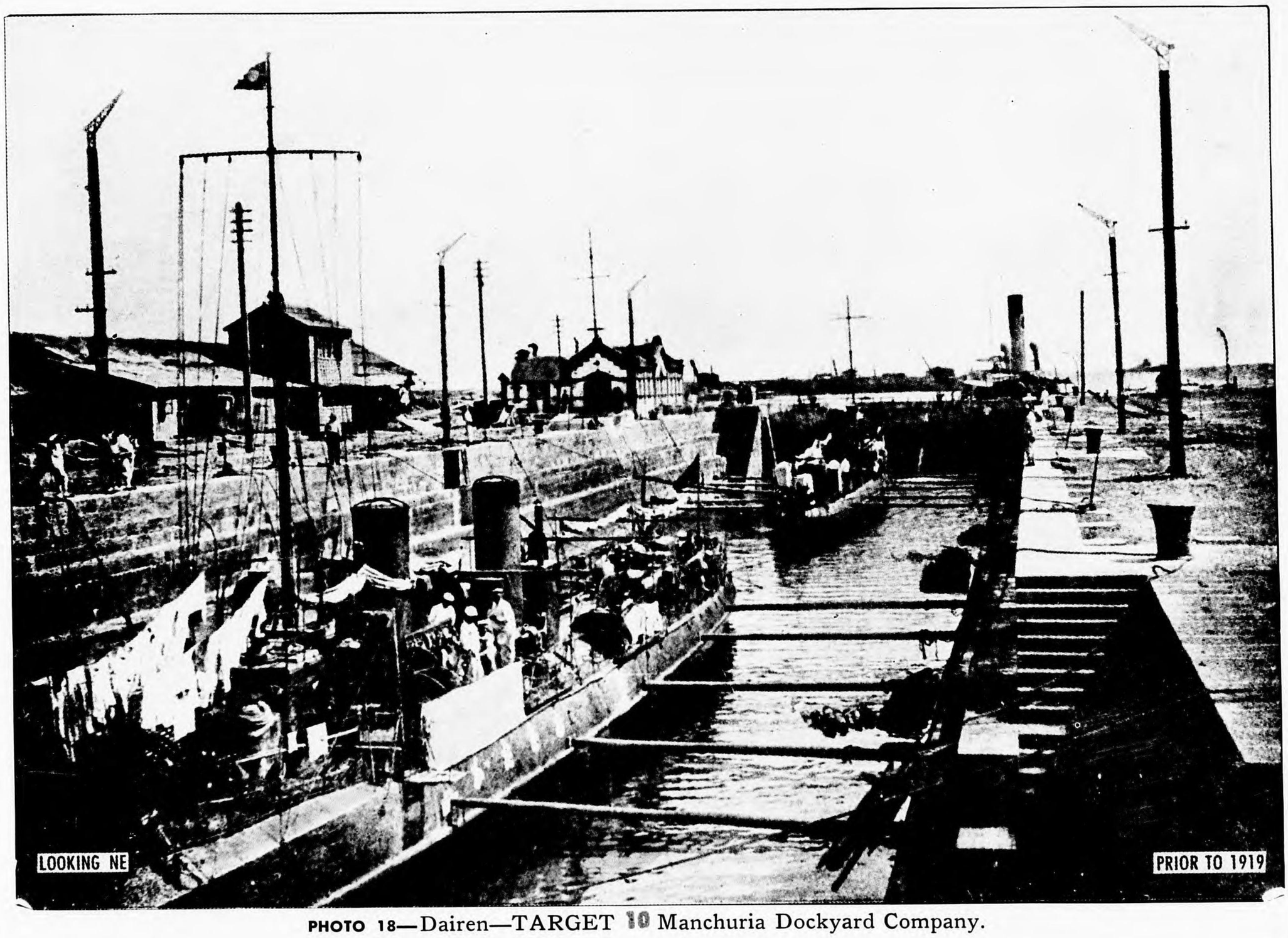


PHOTO 18—Dairen—TARGET 10 Manchuria Dockyard Company.

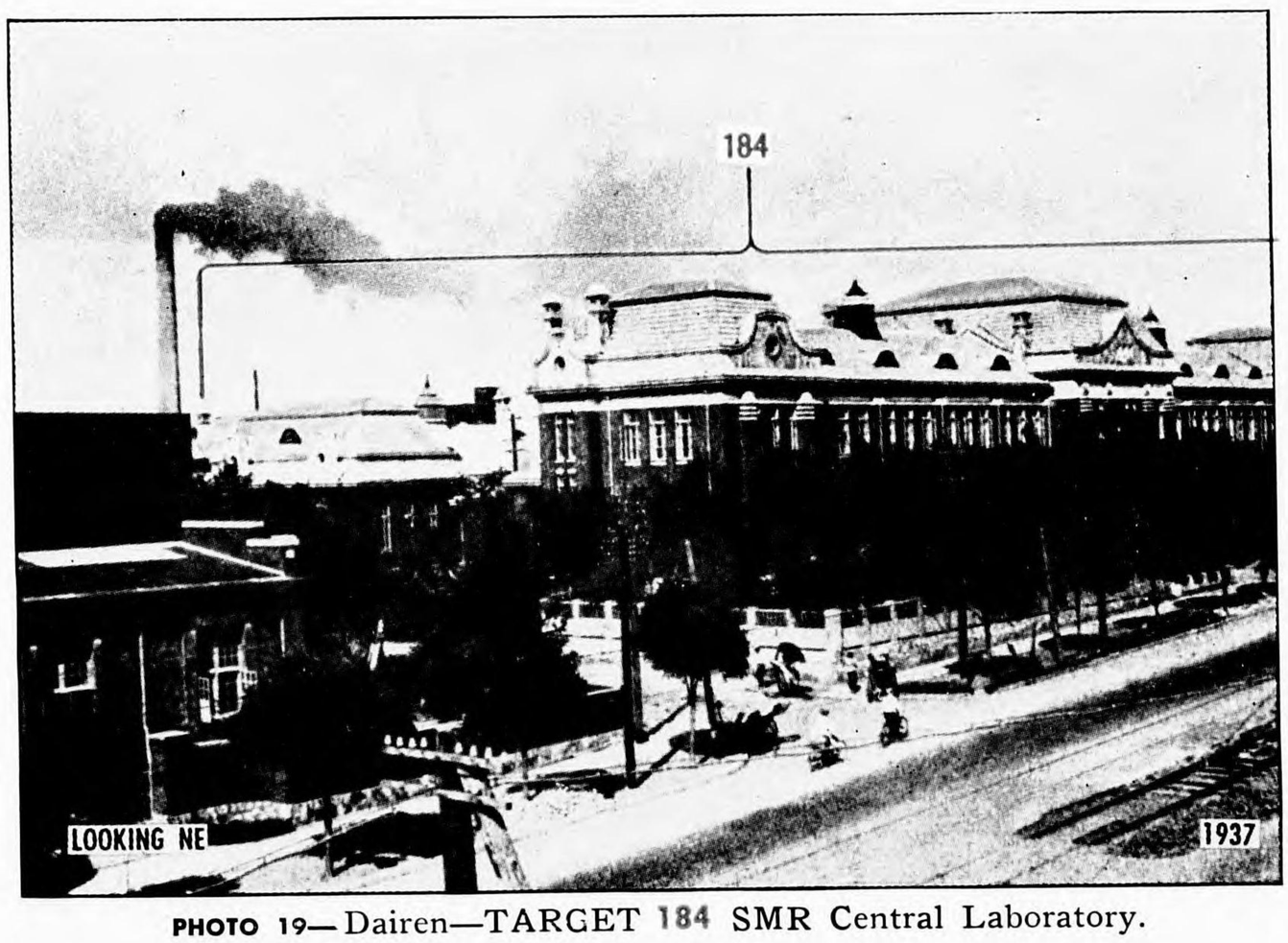
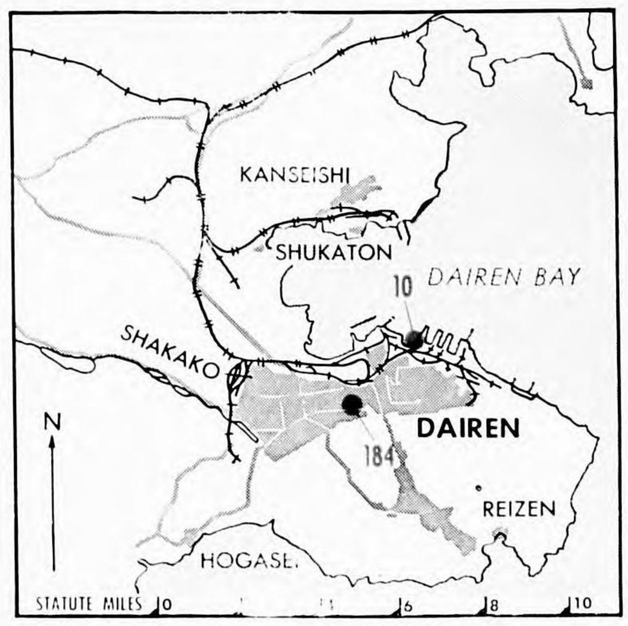


PHOTO 19—Dairen—TARGET 184 SMR Central Laboratory.



TARGET
93.5—
10

MANCHURIA DOCKYARD CO

(Manshu Dokku KK)

DAIREN

(SHIPBUILDING)

38° 56′ N 121° 39′ E (Approx)—Recently enlarged, handles ships to 10,000 tons. Three drydocks: 440 ft, 556 ft, 650-700 ft; several bldg slips. Builds and repairs ships' engines and machinery. Numerous shops with modern equipment include welding, machine, boiler, erecting, electric, etc. shops, pneumatic plant, foundry. Shops located W of dry-docks.

(See photos 4 and 18; map on page M-5.)

TARGET
93.5—
184

SOUTH MANCHURIAN RAILWAY CENTRAL LABORATORY

DAIREN

(CHEMICALS)

38° 55′ N 121° 37′ E (Approx)—Reported most important industrial research center in the Far East. Chemical, metallurgical, fuel, and agricultural research. Laboratories include: electrochemical, ceramic, and general inorganic chemical; metallurgical, and mineral separation; fats and oils, soya bean, fibre, and general organic chemical; coal, mineral oils, synthetic fuels, gas, and general hides and leather; physics. Site covers 33,861 sq meters, bldgs 16,511 sq meters.

(See photo 19; map on page M-5.)

3654—21—Manchuria—12-11-44—First Proof

CONFIDENTIAL equals British Confidential

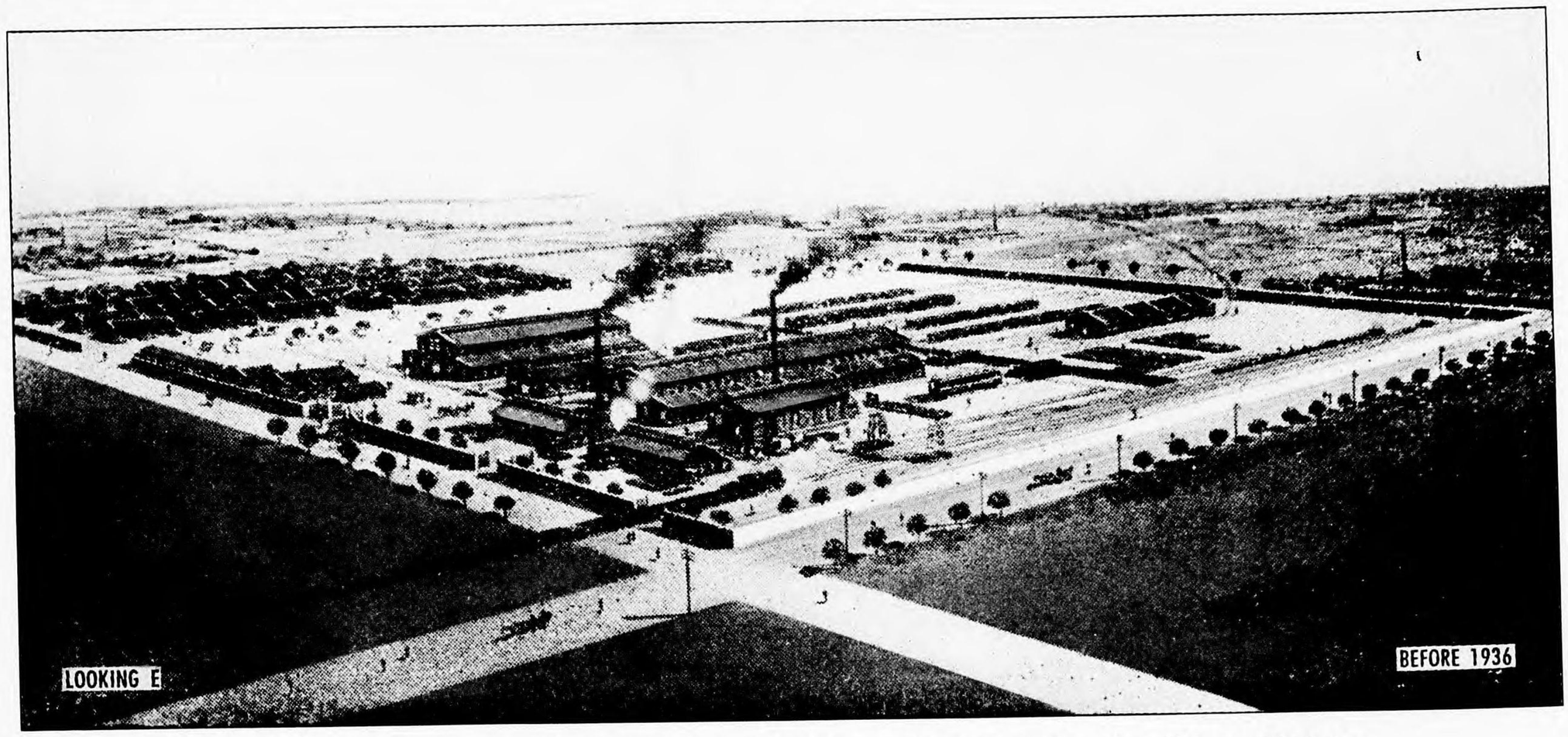


PHOTO 20— Dairen—TARGET 17 Dairen Machinery Co plant and main office at Shakako.

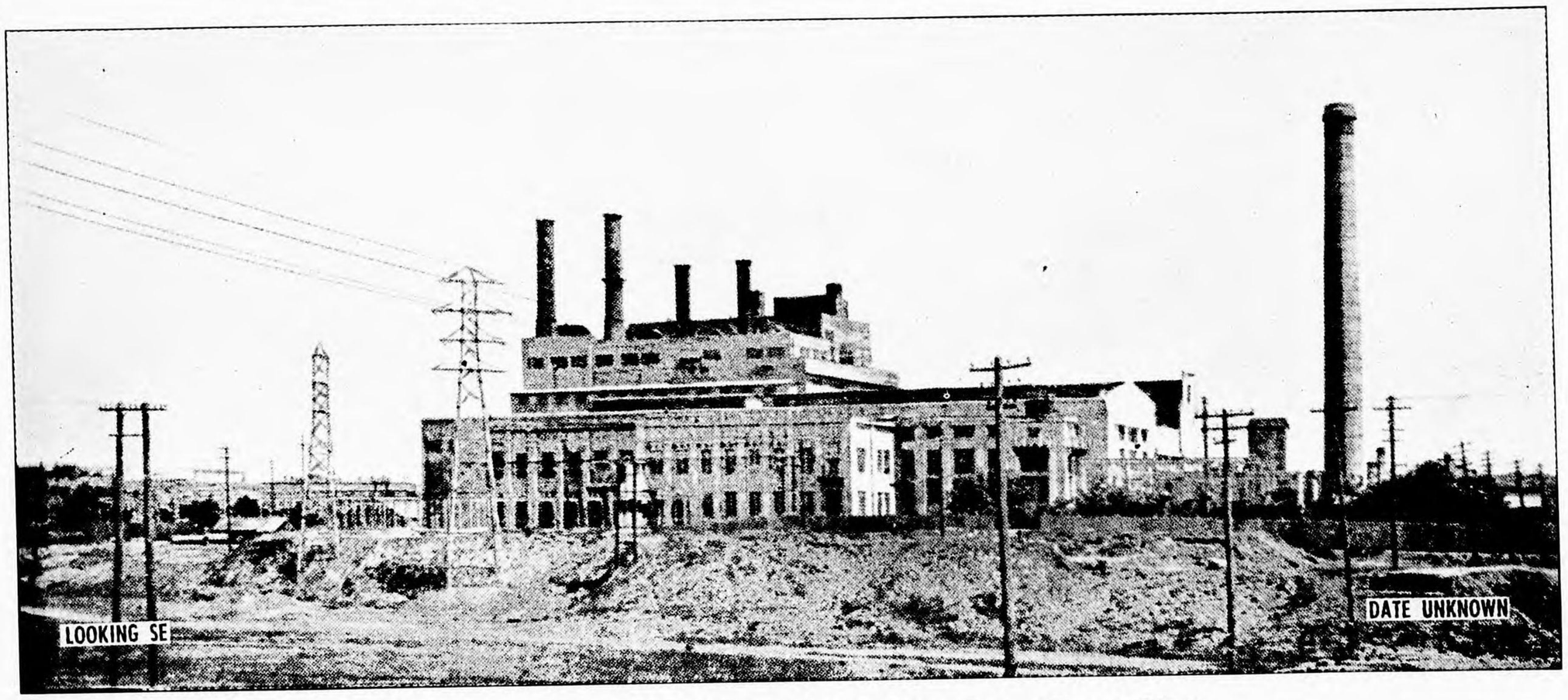
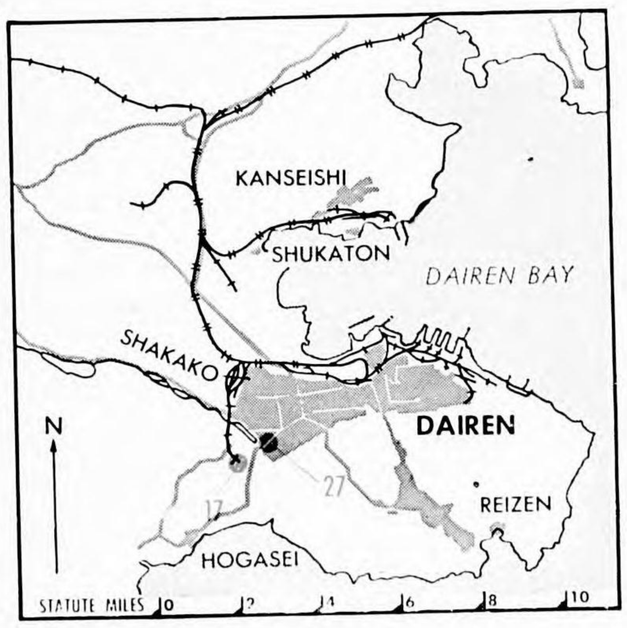


PHOTO 21—Dairen—TARGET 27 Amanagawa Steam Power Plant.



TARGET 93.5—17

DAIREN MACHINERY CO

(KK Dairen Kikai Seizosho)

DAIREN

(MACHINES & MACHINE TOOLS)

38° 54′ N 121° 34′ E (Approx)—Produces small locomotives, passenger and freight cars, aircraft parts, machine tools, tractors, auto bodies, internal combustion engines, steel bridges, boilers, castings, etc. 80% of production was in RR equipment. Planned in 1941 to double this production. Reported recent extensive expansion particularly of aircraft parts plant.

(See photo 20; map on page M-5.)

TARGET 93.5—27

AMANAGAWA STEAM POWER PLANT

DAIREN

(ELECTRIC POWER)

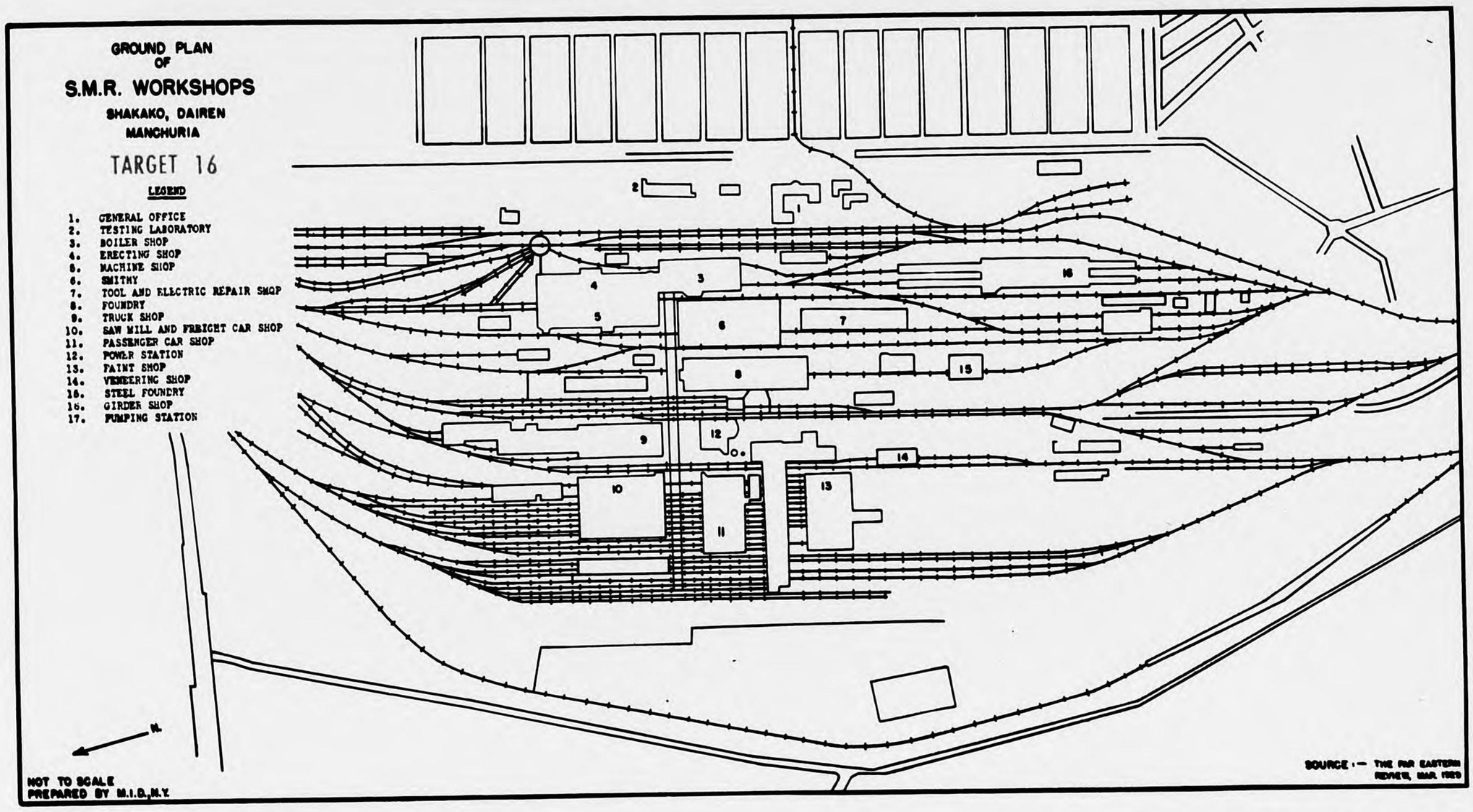
38° 55′ N 121° 35′ E (Approx)—Cap 42,000 KW. Second largest in Dairen region, which also obtains power from Manchuria network. Located in S part of Shakako district near waterworks.

(See photo 21; map on page M-5.)

3654—22—Manchuria—12-11-44—First Proof

MANCHURIA AREAS NOS. 93.1, 2, 3, 4, 5 TARGETS 17, 27 (DAIREN REGION)

CONFIDENTIAL equals British Confidential



TARGET 93.5—16

SOUTH MANCHURIAN RAILWAY WORKSHOPS

DAIREN

(TRANSPORTATION)

38° 56′ N 121° 35′ E (Approx)—Largest and best equipped shops on Continent. Main shops of SMR. Repairs on 285 locomotives, 460 passenger cars, 3600 freight cars in 1933. Largest builder of locomotives and cars in Manchuria. 1933 output of 30 locomotives, 45 passenger cars, 670 freight cars. Repair and production cap since expanded. Other products include bridge girders, high speed drills, tanks, and possibly artillery. Compound of 250 acres. 95 bldgs covering 20 acres in 1935 included erecting, boiler, machine, car, and girder shops, iron and steel foundries, power house. Independent water supply. Estimated labor force of 6000. Extensive freight yards.

(See photos 22 and 23; map on page M-5.)

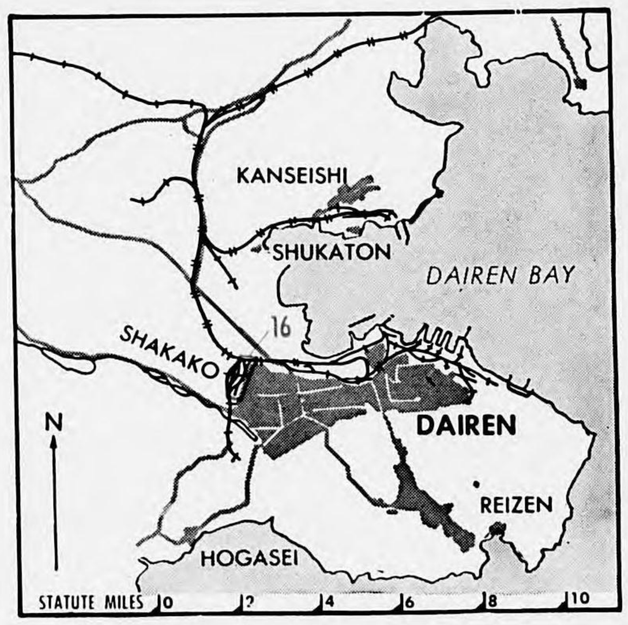
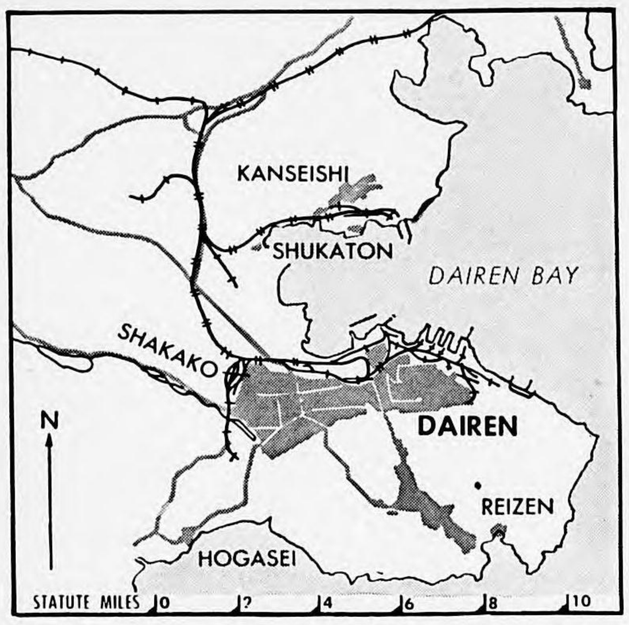
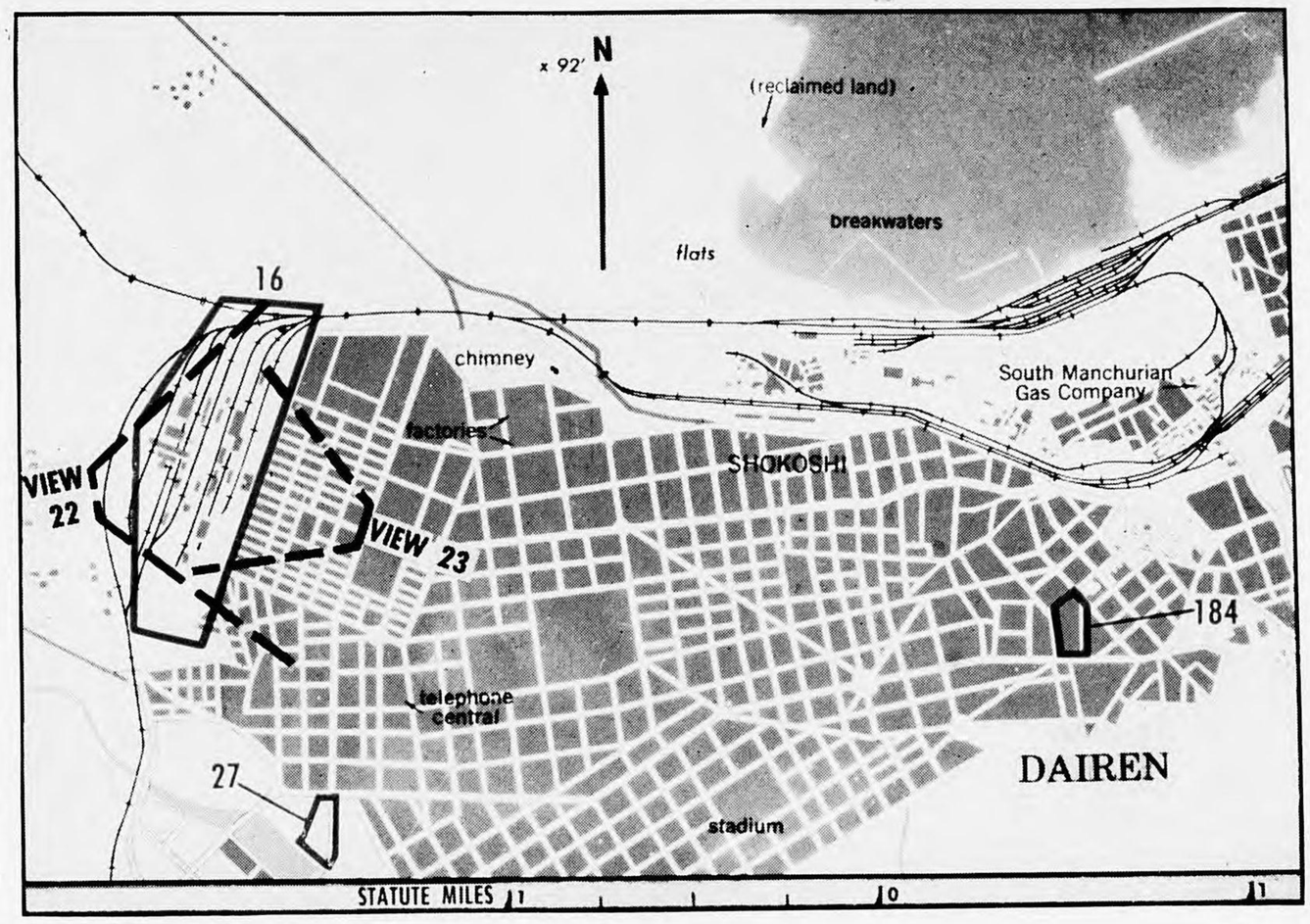


PHOTO 22— Dairen—TARGET 16 SMR Workshops at Shakako. For direction of photo, see VIEW 22 on page 24.

3654—23—Manchuria—12-11-44—First Proof





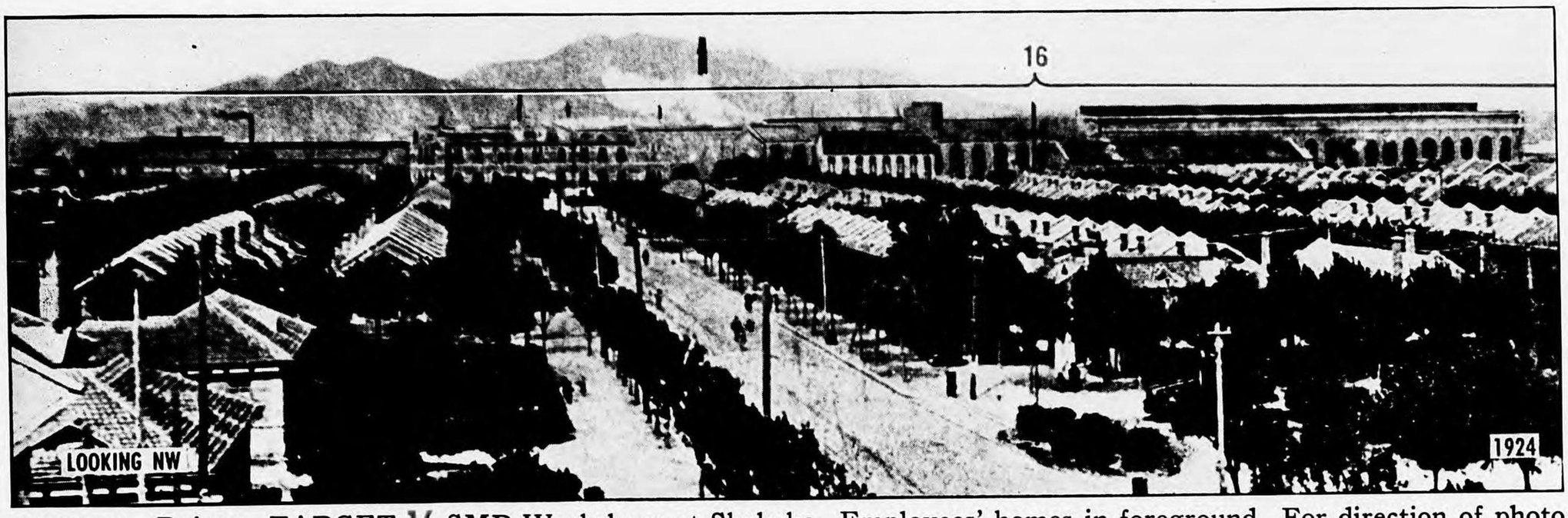


PHOTO 23—Dairen—TARGET 16 SMR Workshops at Shakako. Employees' homes in foreground. For direction of photo, note VIEW 23.

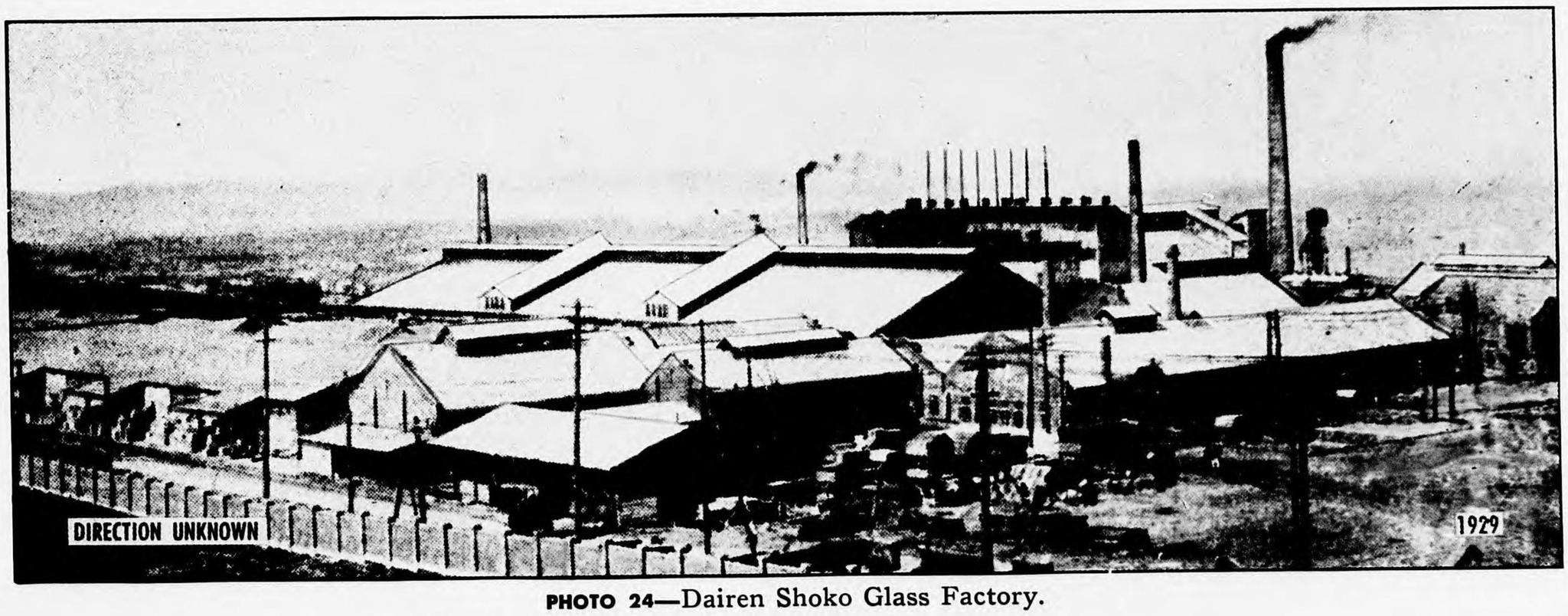
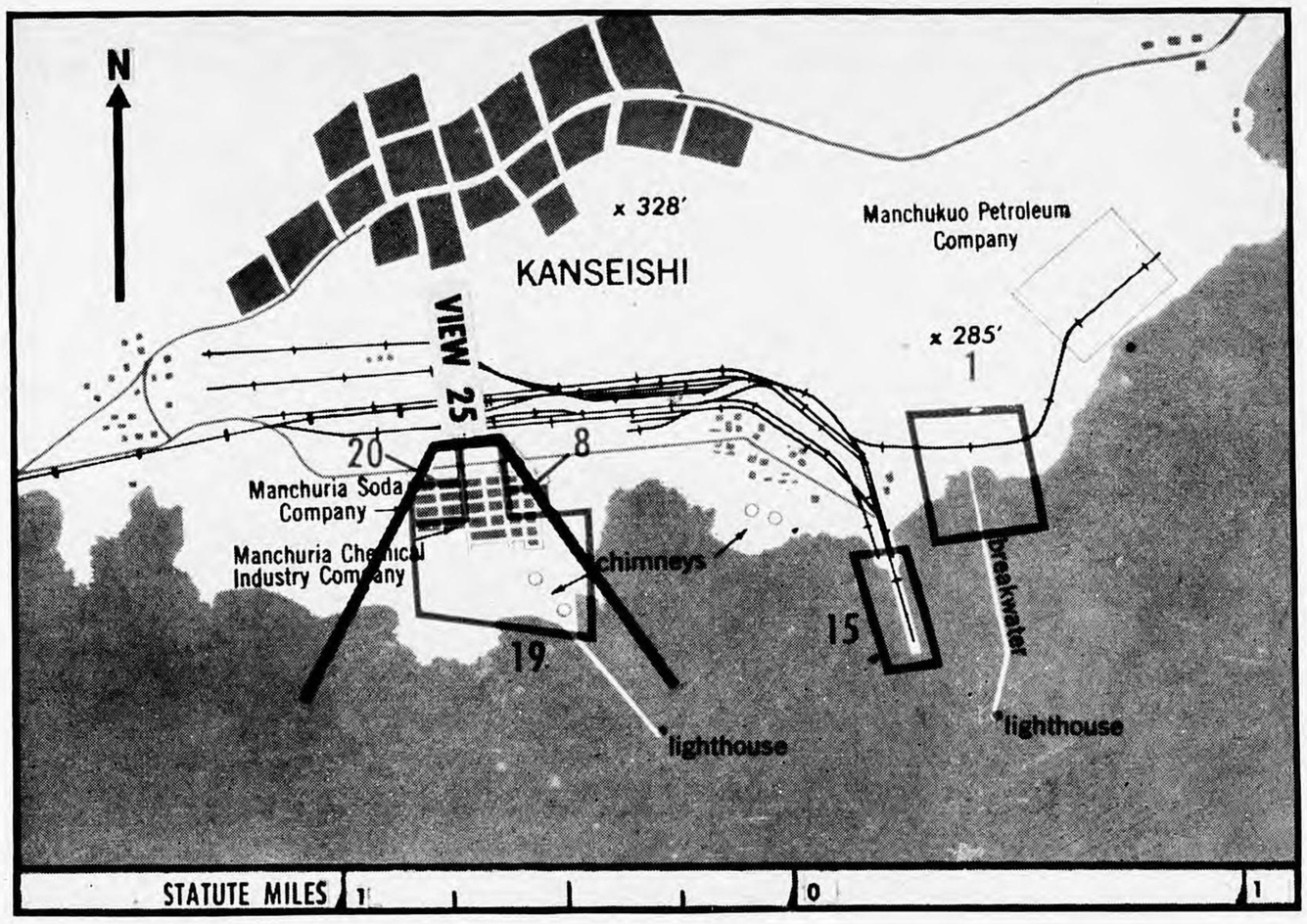


PHOTO 24—Dairen Shoko Glass Factory.

MANCHURIA AREAS NOS. 93.1, 2, 3, 4, 5 TARGET 16 (DAIREN REGION)

3654—24—Manchuria—12-1-44—First Proof

CONFIDENTIAL equals British Confidential



TARGET 93.5— 8

KANSEISHI STEAM POWER PLANT

KANSEISHI

(ELECTRIC POWER)

38° 58′ N 121° 37′ E (Approx)—Cap 83,000 KW. Largest in Dairen region, which is interconnected with Manchuria Network. Additional unit of 25,000 KW reported under construction in 1940. Adjoins Manchurian Chemical Industry Co plant (TARGET 19) on Kanseishi waterfront.

(See photos 25 and 26; map on page M-5.)

TARGET 93.5— 20

MANCHURIA SODA CO

(Manshu Soda KK)

KANSEISHI

(CHEMICALS)

38° 58′ N 121° 37′ E (Approx)—Only large pre-war soda ash producer in Manchuria, with cap for nearly all local needs. Pre-war cap 75,000 metric tons. Uses local salt.

(See photo 25; map on page M-5.)

TARGET 93.5— 19

MANCHURIAN CHEMICAL INDUSTRY

(Manshu Kagaku Kogyo KK)

KANSEISHI

(CHEMICALS)

38° 58′ N 121° 37′ E (Approx)—Largest nitrogen fixation plant in Manchuria; fifth largest in the Inner Zone. Produces ammonia, nitric acid, explosives, fertilizer and coke by-products. Pre-war production in metric tons included 240,000 of ammonium sulphate, and 250,000 of sulphuric acid. Reported battery of 35 coke ovens on E side of compound.

(See photos 25 and 26; map on page M-5.)

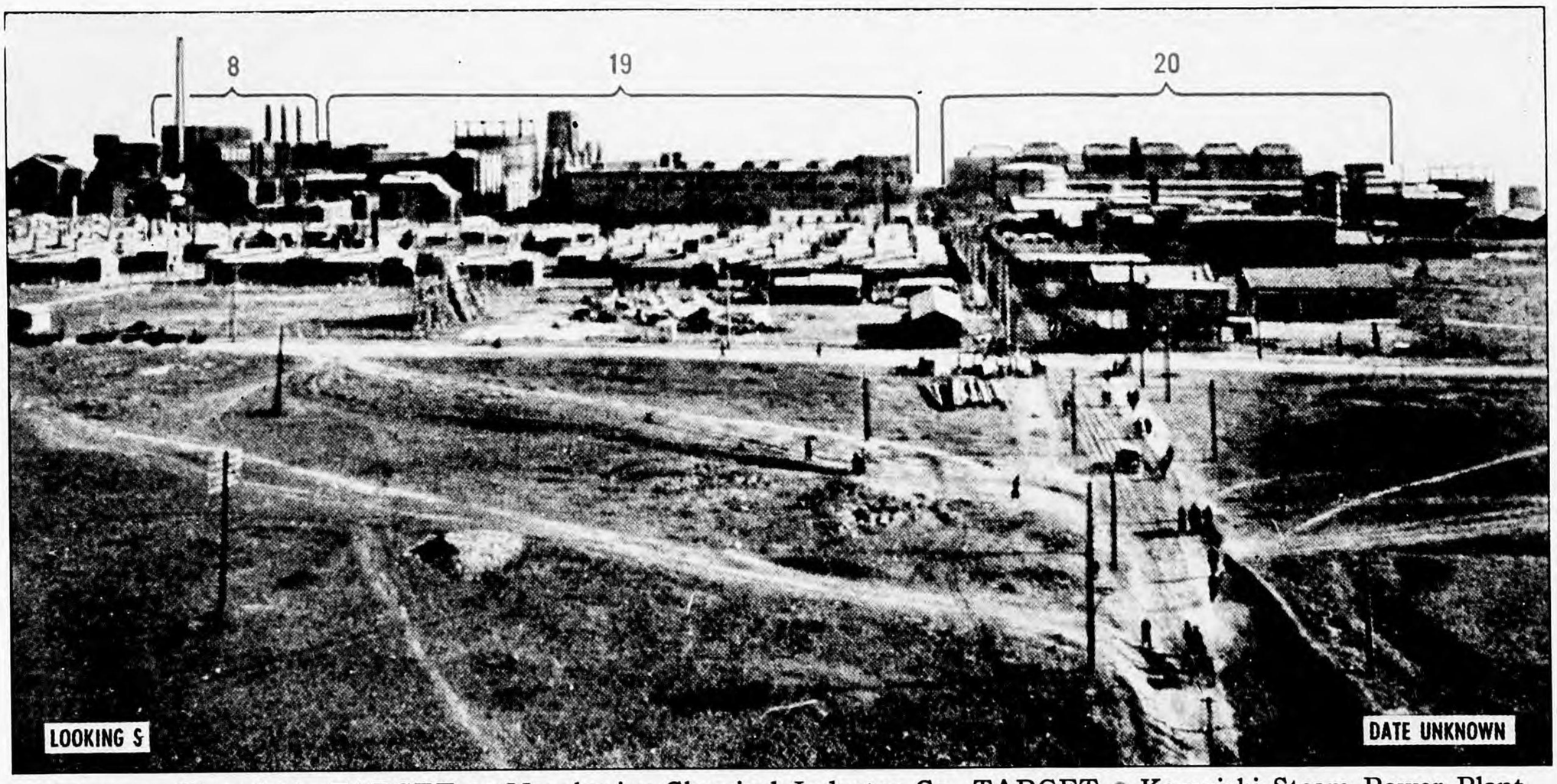


PHOTO 25—Kanseishi—TARGET 19 Manchurian Chemical Industry Co. TARGET 8 Kanseishi Steam Power Plant. TARGET 20 Manchurian Soda Co. For direction of photo, note VIEW 25.

PHOTO 26—Kanseishi—TARGET 19 Manchurian Chemical Industry Co. TARGET 8 Kanseishi Steam Power Plant.

CONFIDENTIAL equals British Confidential

MANCHURIA AREAS NOS. 93.1, 2, 3, 4, 5 TARGETS 8, 19, 20 (DAIREN REGION)

1654—25—Manchuria—10-11-44—First Proof

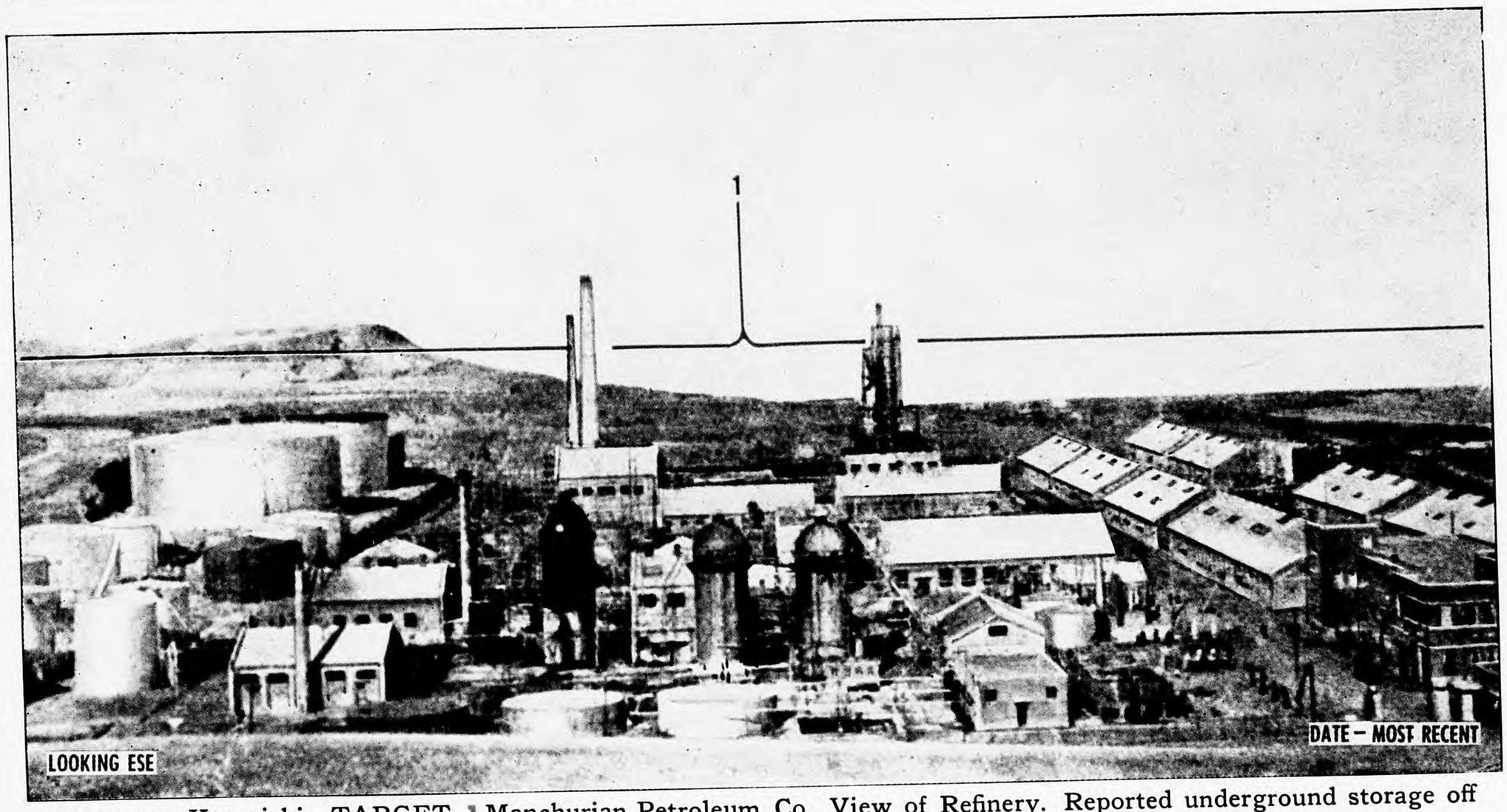
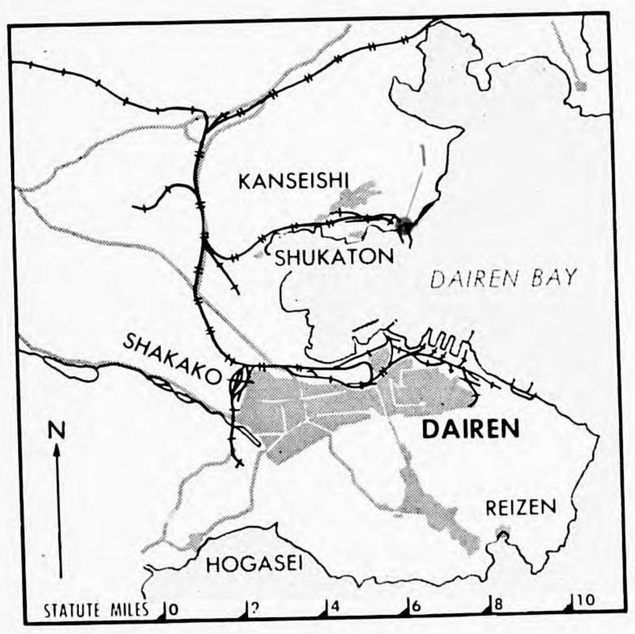


PHOTO 27—Kanseishi—TARGET 1 Manchurian Petroleum Co. View of Refinery. Reported underground storage off photo, left.



TARGET 93.5—1

MANCHURIA PETROLEUM CO

(Manshu Sekiyu KK)

KANSEISHI

(PETROLEUM)

38° 58′ N 121° 39′ E (Approx)—With possible exception of refining cap at Fushun shale plant, largest oil refinery in Manchuria, and 6th largest in the Inner Zone with approx 5% of the total cap. Relative important contingent upon annual refining cap: crude 1,650,000 bbls, cracking 660,000 bbls, iso-octane 4290 bbls. Aviation and regular lube oils also produced. Storage cap estimated at approx 750,000 bbls in 75 tanks of all types.

(See photos 27 and 28; map on page M-5.)

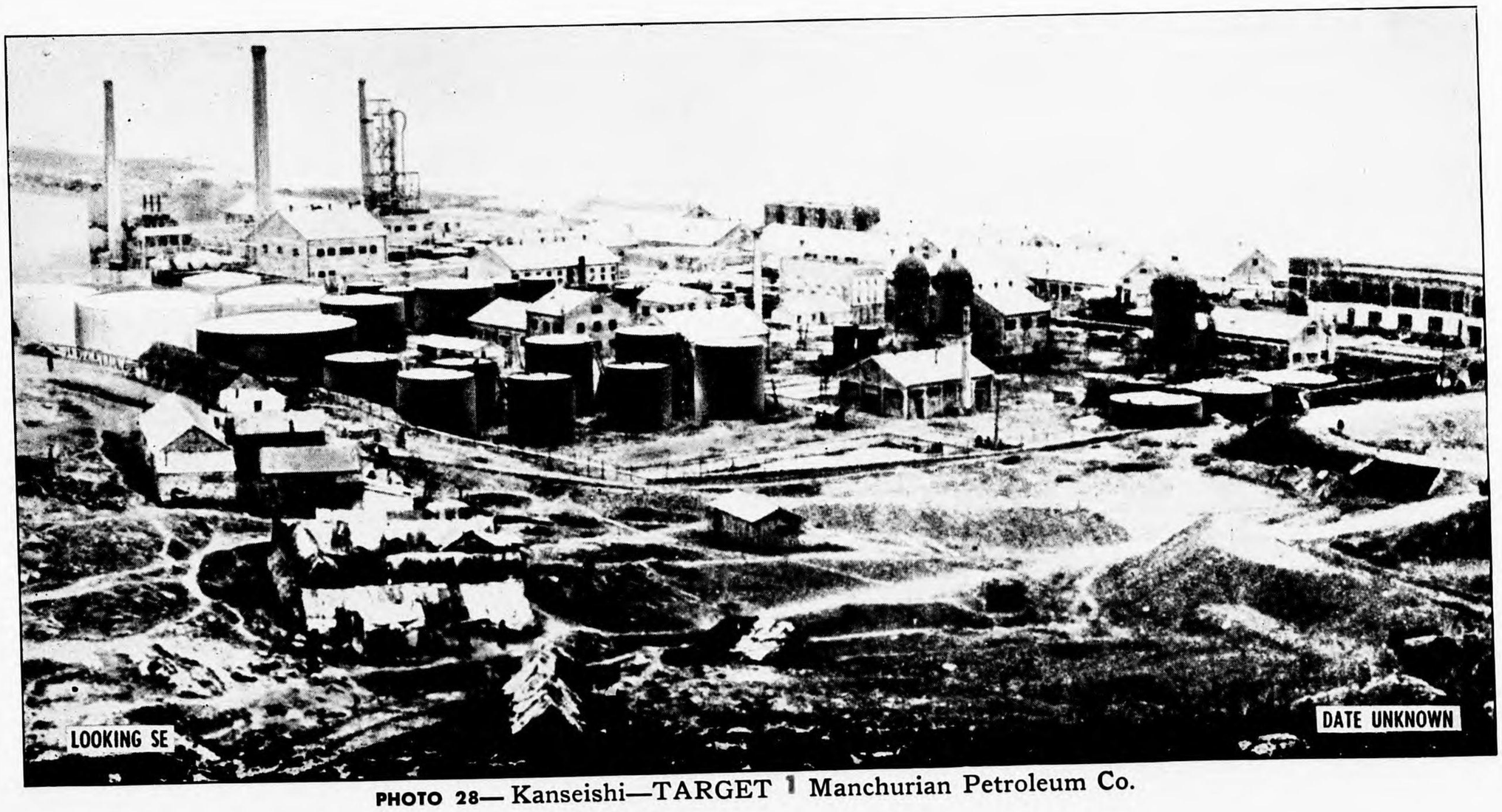


PHOTO 28— Kanseishi—TARGET 1 Manchurian Petroleum Co.

PHOTO 29—Kanseishi—TARGET 15 Kanseishi Coal Pier. View of Dairen in distance.

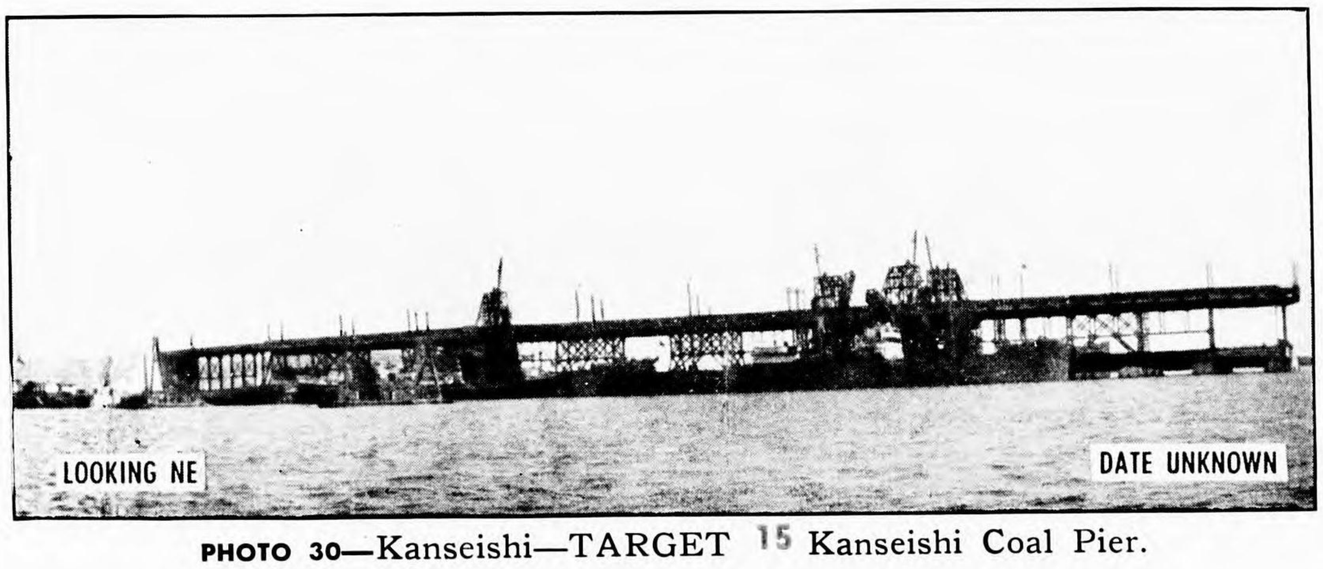


PHOTO 30—Kanseishi—TARGET 15 Kanseishi Coal Pier.

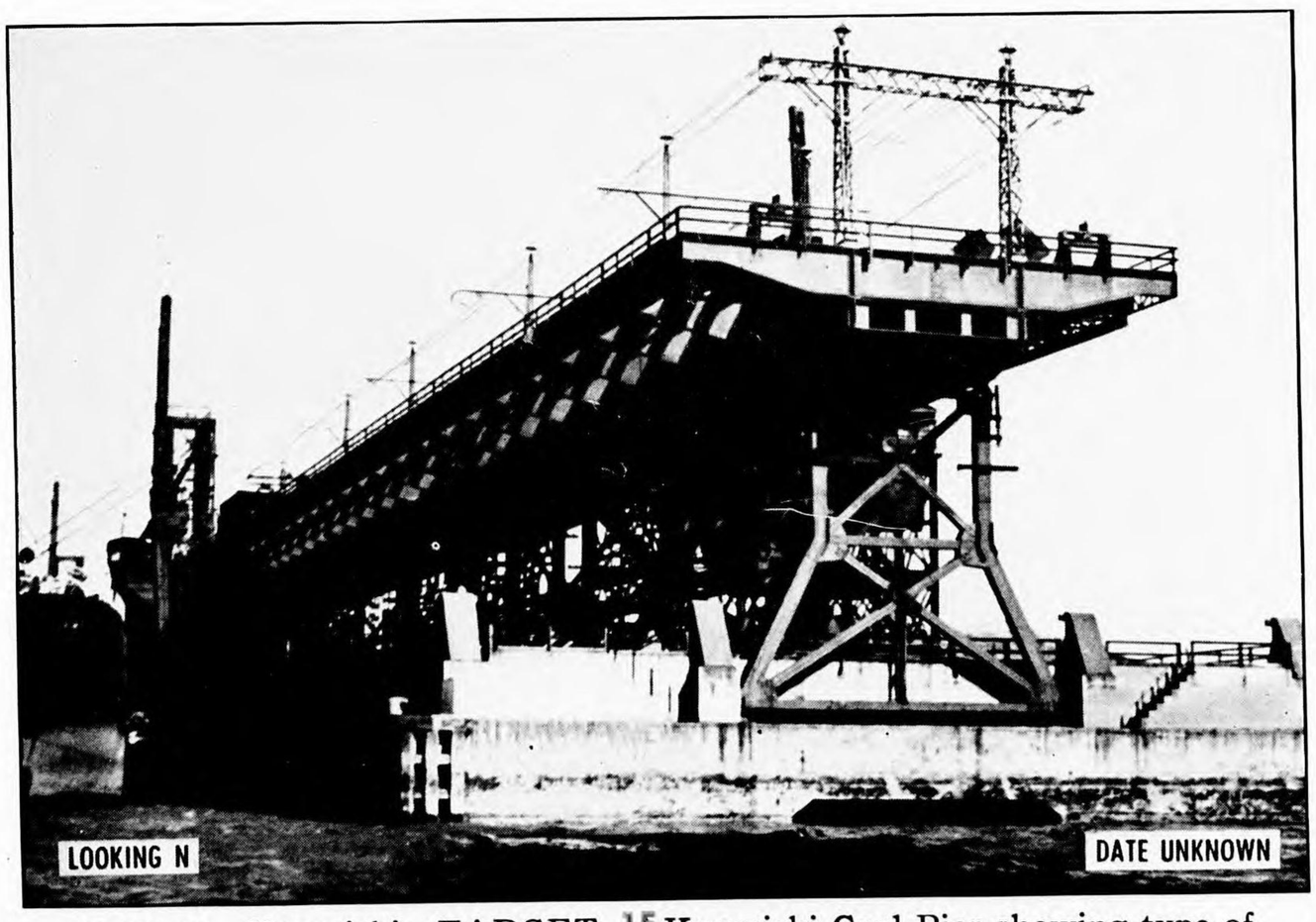


PHOTO 31—Kanseishi—TARGET 15 Kanseishi Coal Pier showing type of construction.

TARGET 93.5—15

KANSEISHI COAL PIER

KANSEISHI

(COAL AND COKE)

38° 58′ N 121° 38′ E (Approx)—Largest and fastest coal shipping and bunkering installation N of Hongai. Steel and concrete pier 1000 by 150 ft, berths four vessels and loads from overhead RR cars at rate of 1000 tons per hour. Factor in quick turn around of vessels which are loaded discharged on the Dairen side.

(See photos 29, 30, 31 and 32; map on page M-5.)

3654—27—Manchuria—12-11-44—First Proof

MANCHURIA AREAS NOS. 93.1, 2, 3, 4, 5 TARGET 15 (DAIREN REGION)

CONFIDENTIAL equals British Confidential

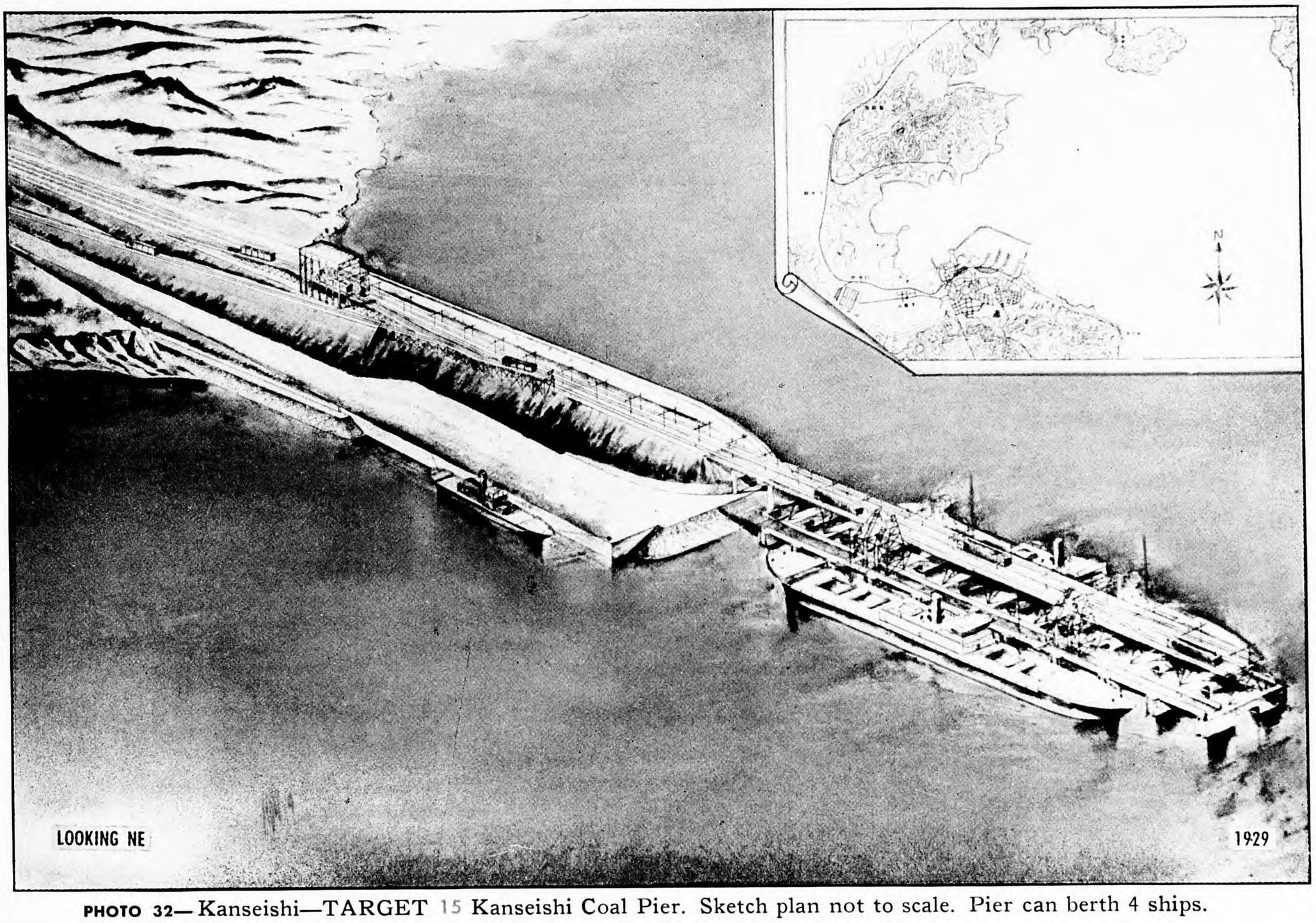


PHOTO 32— Kanseishi—TARGET 15 Kanseishi Coal Pier. Sketch plan not to scale. Pier can berth 4 ships.

MANCHURIA AREAS NOS. 93.1, 2, 3, 4, 5 TARGET 15 (DAIREN REGION)

3654—28—Manchuria—12-11-44—First Proof

CONFIDENTIAL equals British Confidential

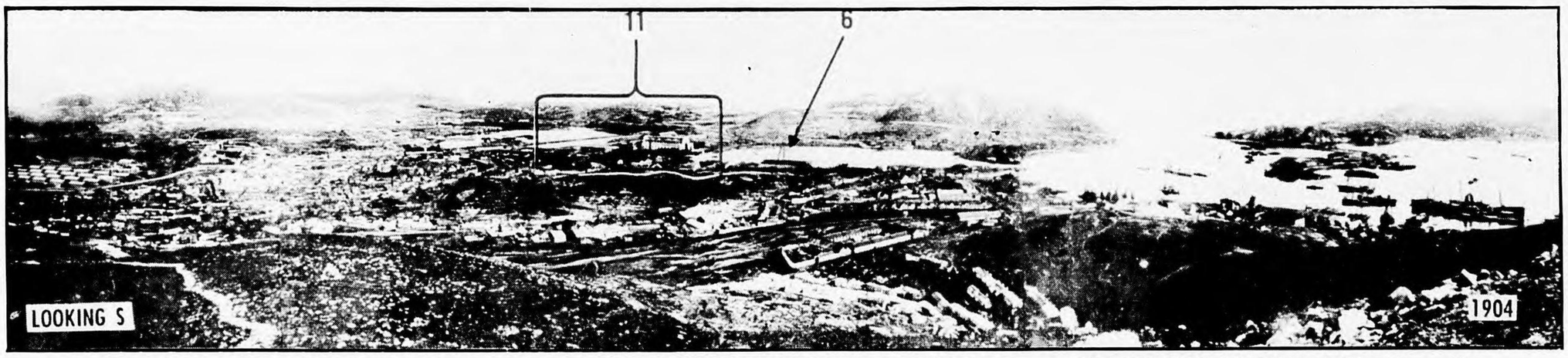


PHOTO 33—Port Arthur—Panorama of City. TARGET 6 Naval Oil Storage. TARGET 11 Naval Dockyard.

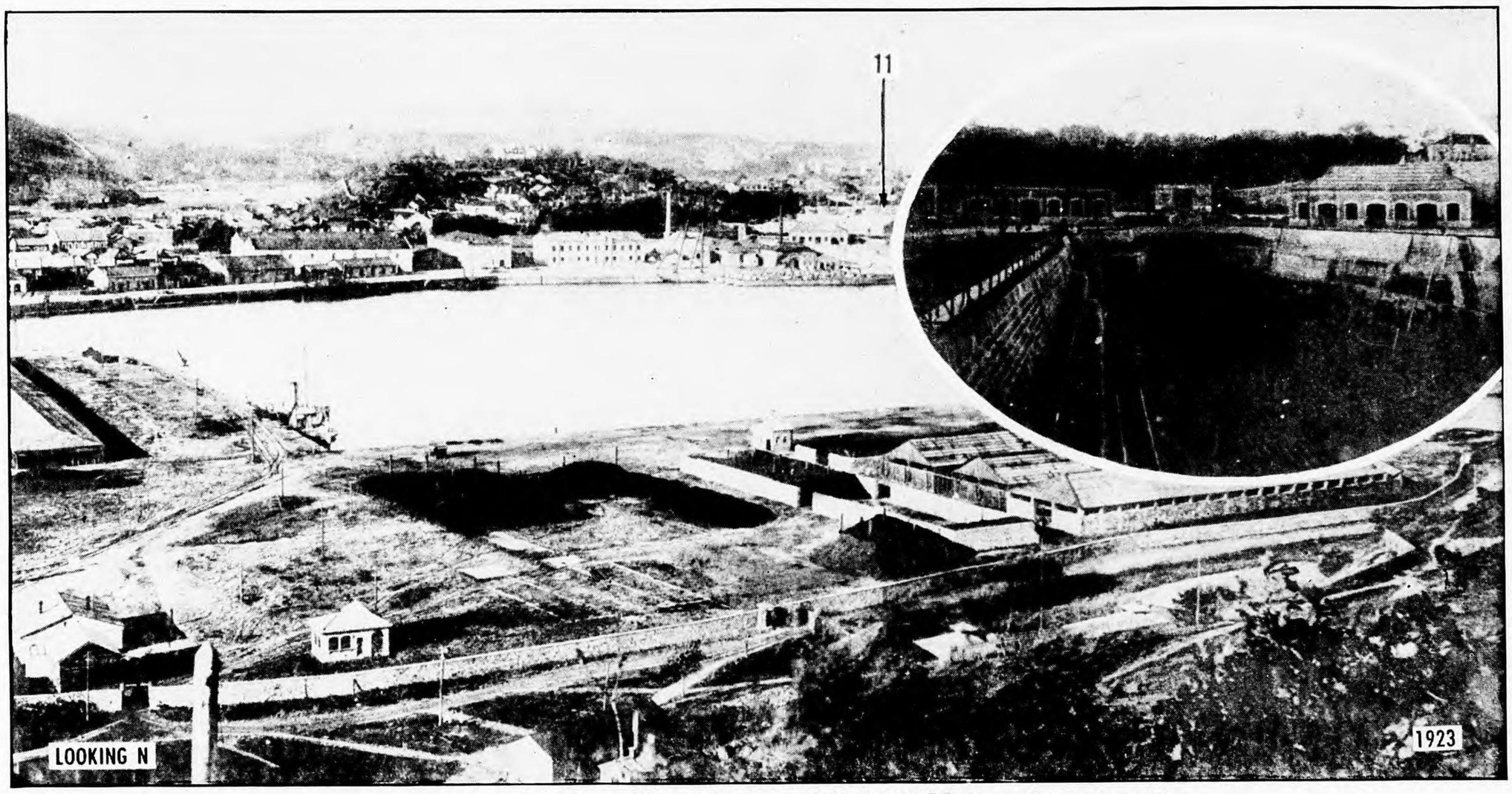


PHOTO 34—Port Arthur East Basin—TARGET 11 Naval Dockyards.

TARGET 93.5— 6

NAVAL OIL STORAGE

PORT ARTHUR

(PETROLEUM)

38° 48′ N 121° 16′ E (Approx)—Cap estimated at about 210,000 bbls. Five tanks reported, underground storage known to exist.

(See photo 33; map on page M-4.)

TARGET 93.5— 11

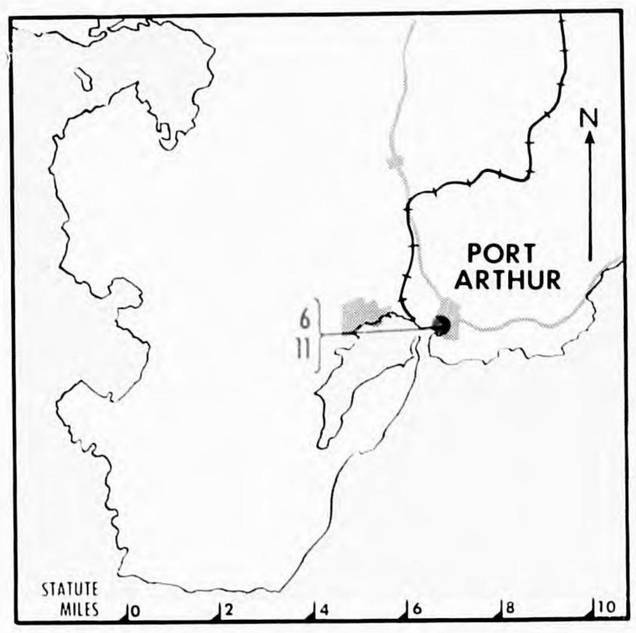
NAVAL DOCKYARD

PORT ARTHUR

(NAVAL BASES)

38° 48′ N 121° 16′ E (Approx)—Reported to have been developed by Navy into secondary yard. Includes two graving docks, 535 ft and 500 ft; one bldg slip, 3000 tons; power house, maintenance and repair shops.

(See photos 33 and 34; map on page M-4.)



3654-L-29—Manchuria—12-11-44—First Proof

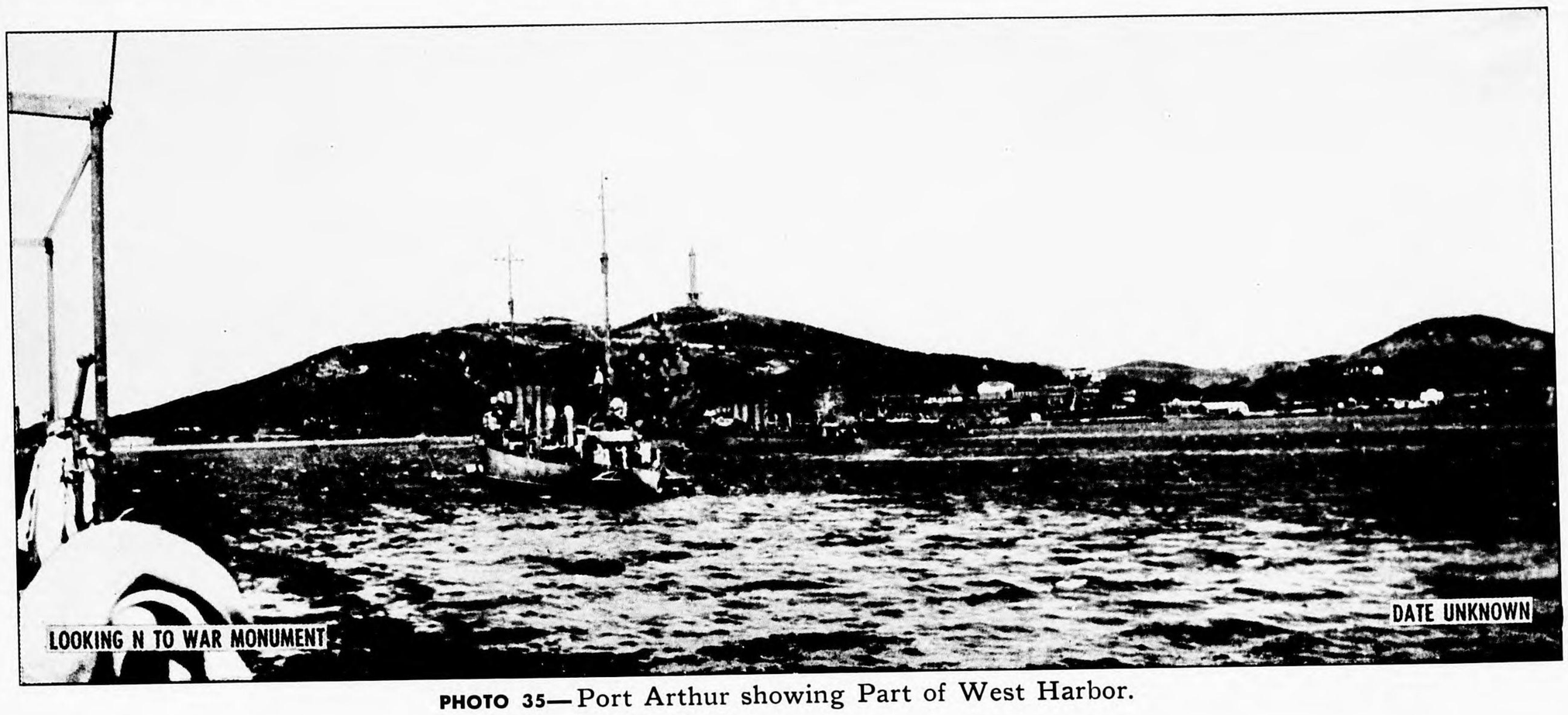


PHOTO 35—Port Arthur showing Part of West Harbor.

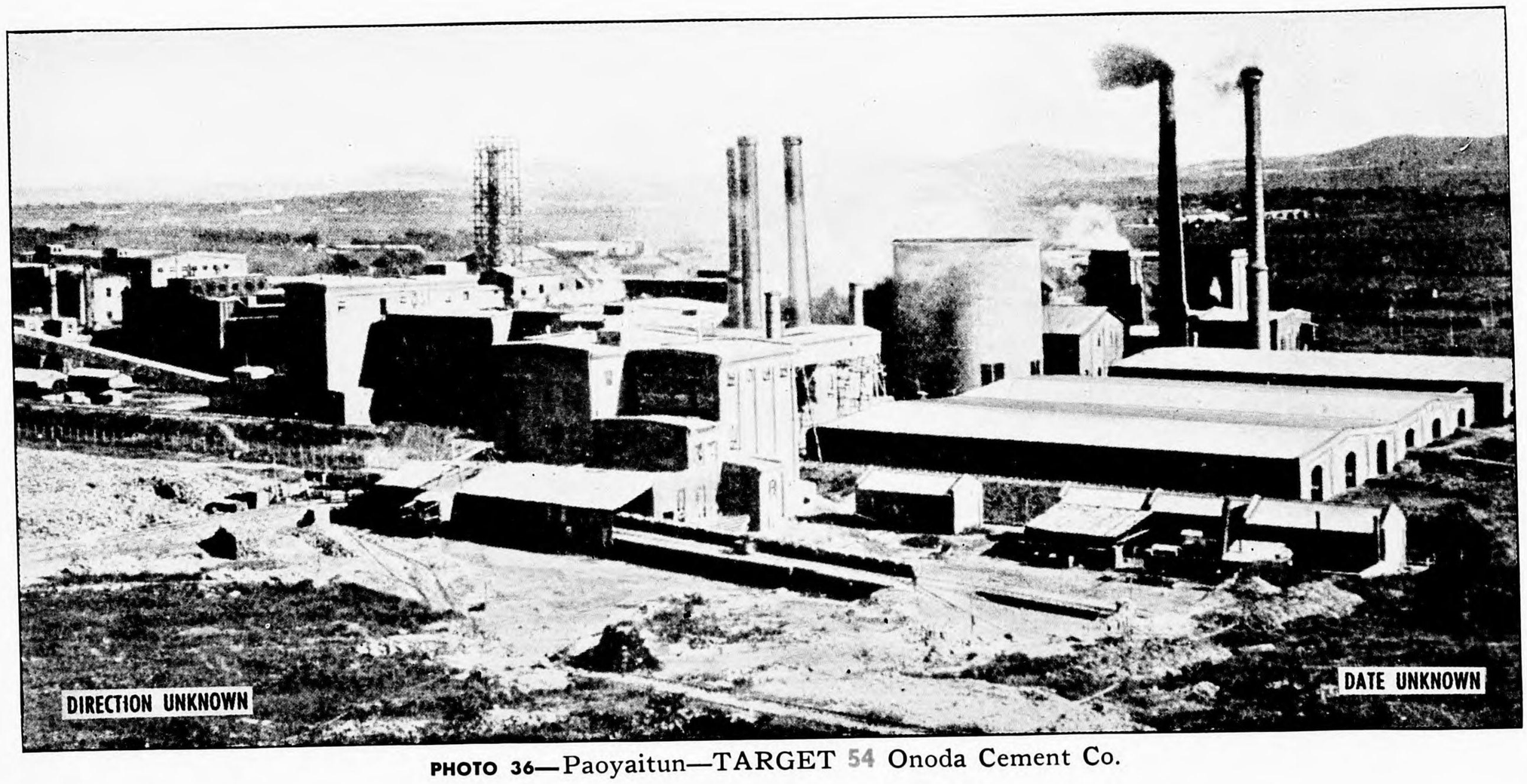
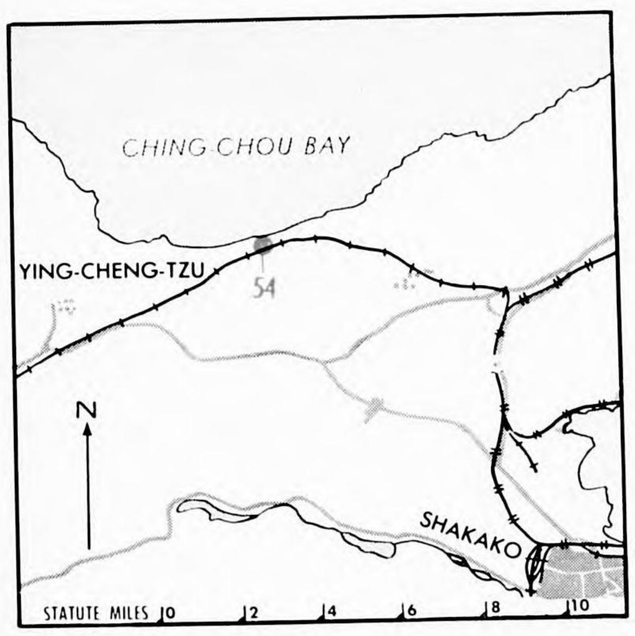


PHOTO 36—Paoyaitun—TARGET 54 Onoda Cement Co.



TARGET 93.5—54

ONODA CEMENT WORKS

(Kwanto Shu Onoda Cement Seizo KK)

PAOYAITUN

(BUILDING MATERIALS)

38° 58′ N 121° 31′ E (Approx)—Large for Manchuria. Pre-war cap 255,000 metric tons cement, 10,000 metric tons calcium carbide.

(See photo 36.)

MANCHURIA AREAS NOS. 93.1, 2, 3, 4, 5 TARGET 54 (DAIREN REGION)

3654—30—Manchuria—12-11-44—First Proof

CONFIDENTIAL equals British Confidential

Air Objective Folder
ANSHAN REGION
MANCHURIA AREAS, Nos. 93.1, 2, 3, 4, 5

INDEX OF TARGETS BY NUMBER, CLASSIFICATION AND NAME

TARGET NUMBER	NAME	PAGE
	IRON AND STEEL	
29	Showa Steel Works	32

Summary and Evaluation of Anshan Region

Showa Steel Works **TARGET 29**, the second largest integrated pig iron/steel plant in the Japanese system and the greatest industrial installation on the Asiatic mainland, is at Anshan.

The plant and the city lie on the eastern edge of the Manchurian Plain midway between Mukden and the bight of the Liaotung Gulf to the southwest. The double-tracked mainline of the Mukden-Dairen Railroad skirting the foothills of the mountainous region to the east, passes the plant and bi-sects the city adjacent to the south.

The old city on the west of the tracks houses most of the plant's labor.

Within a radius of eight miles east of the plant are open-cut and shaft mines which supply about two-thirds of capacity requirements in iron ore. These mines, connected with the plant by electric railways, have not been listed as targets.

In addition to the mainline railroad there is the important single-tracked line from Fushun via Penhsihu, providing an alternate route for the large quantity of coal required, and tapping the mining area between Penhsihu and Anshan.

The plant area, occupying an area about 2½ miles square, and the adjacent city, is the most conspicuous landmark on the line from Mukden to Dairen.

INDEX AND SUMMARY (ANSHAN REGION) MANCHURIA AREAS NOS. 93.1, 2, 3, 4, 5

3654 3630—31—Manchuria—7-11-44—First Proof

CONFIDENTIAL equals British Confidential

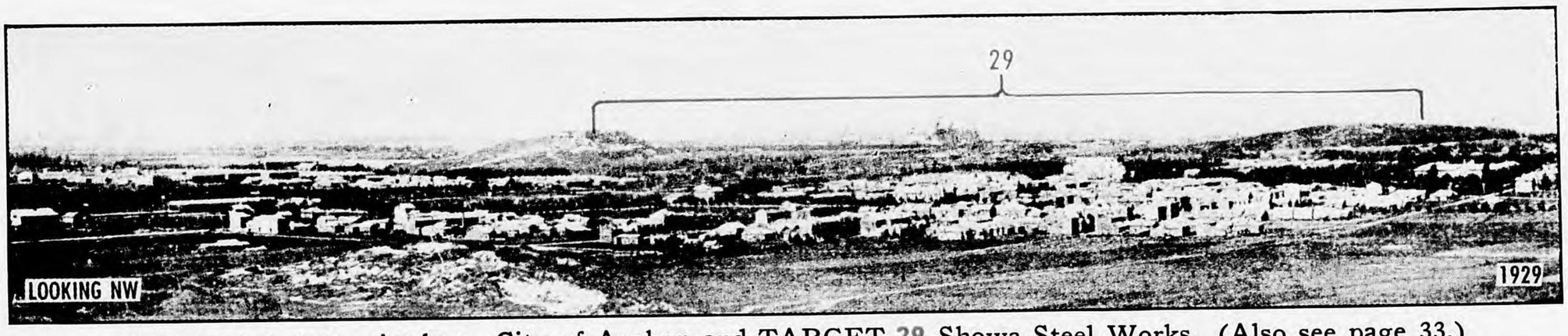
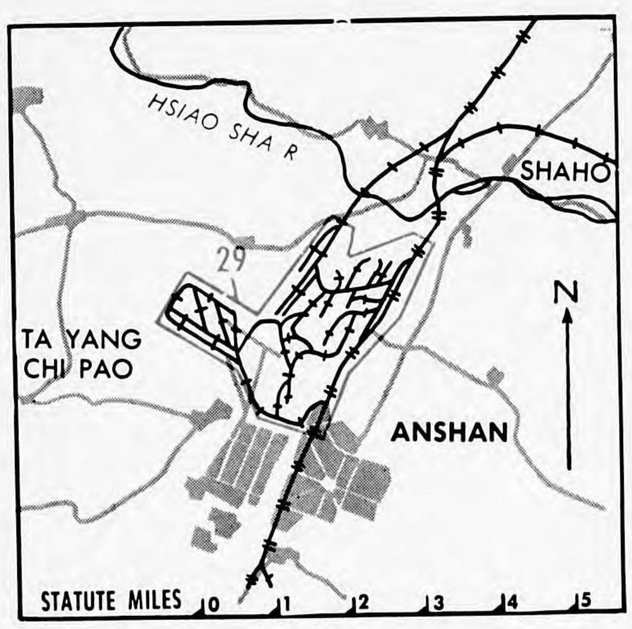
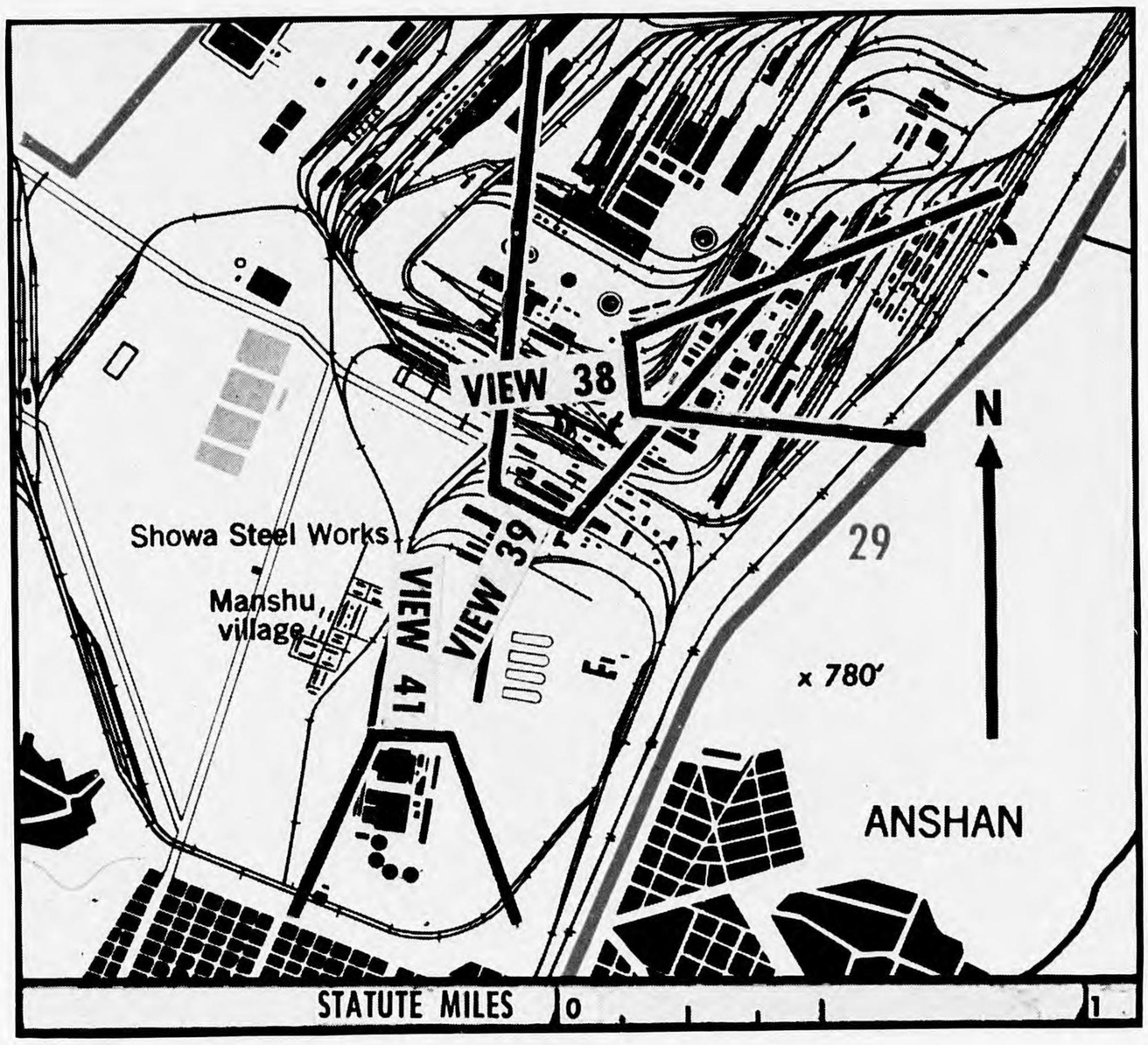


PHOTO 37 (left half)—Anshan—City of Anshan and TARGET 29 Showa Steel Works. (Also see page 33.)





TARGET 93.3— 29

SHOWA STEEL WORKS

(KK Showa Seikosho)

ANSHAN

(IRON AND STEEL)

41° 05′ N 122° 56′ E (Approx)—Second largest integrated pig iron/steel works in the Japanese system, exceeded in cap only by the Yawata works in Japan Proper. Estimated 1944 caps (in metric tons) and approx per cent of total under Japanese control:

Coke	4,500,000	34
Pig iron	1,900,000	15
Ingot steel	1,000,000	8
Rolling mill	900,000	10

Coke not all metallurgical; surplus coke may be supplied to synthetic oil plants. Ore treatment and concentrating cap approx 2,200,000 metric tons. Installations include nine blast furnaces, 18 cokeoven batteries with adjacent by-products plant, two banks of open hearth furnaces, series of rolling mills. Two steam power plants (86,000 KW total cap) in site, inter-connected with Manchuria network. Cement plant (cap 125,000 tons) using slag also in compound. Plant area approx 2½ mi sq. Served by spurs from adjacent Mukden-Dairen double-tracked main-line, and by several spurs to local iron mines. If works at cap, rail facilities required to handle some 18,000,000 tons per year in and out of plant area.

(See photos 37, 38, 39, 40, 41 and 42; maps on pages M-6 and M-7.)

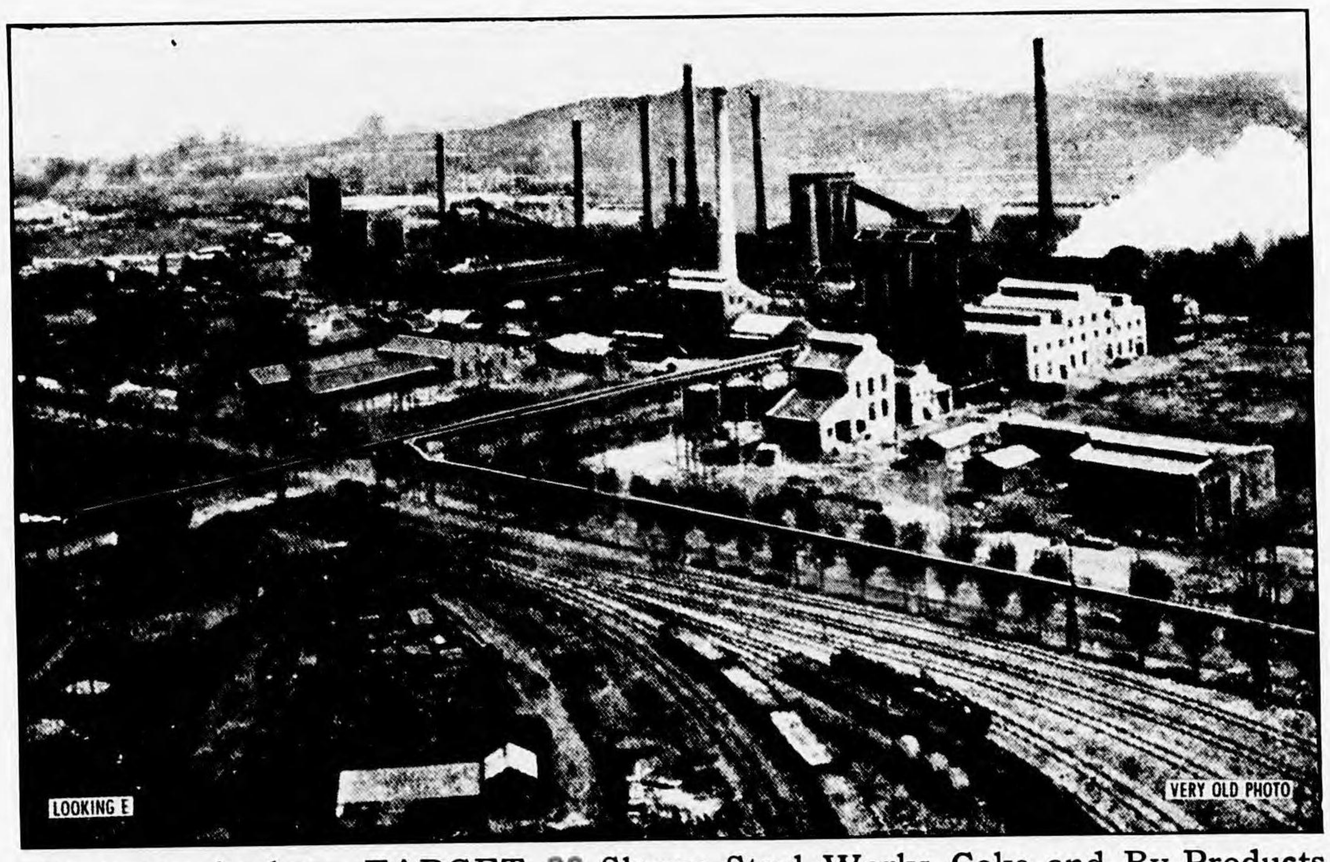


PHOTO 38—Anshan—TARGET 29 Showa Steel Works Coke and By-Products Plant. Very old photo. For direction of photo, note VIEW 38.

3654-1-32—Manchuria—12-11-44—First Proof

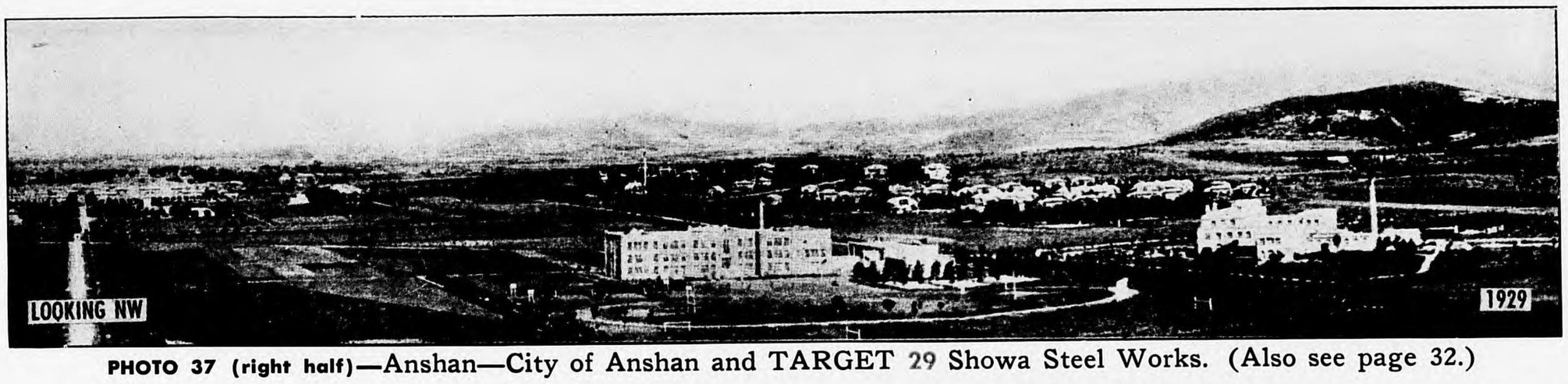
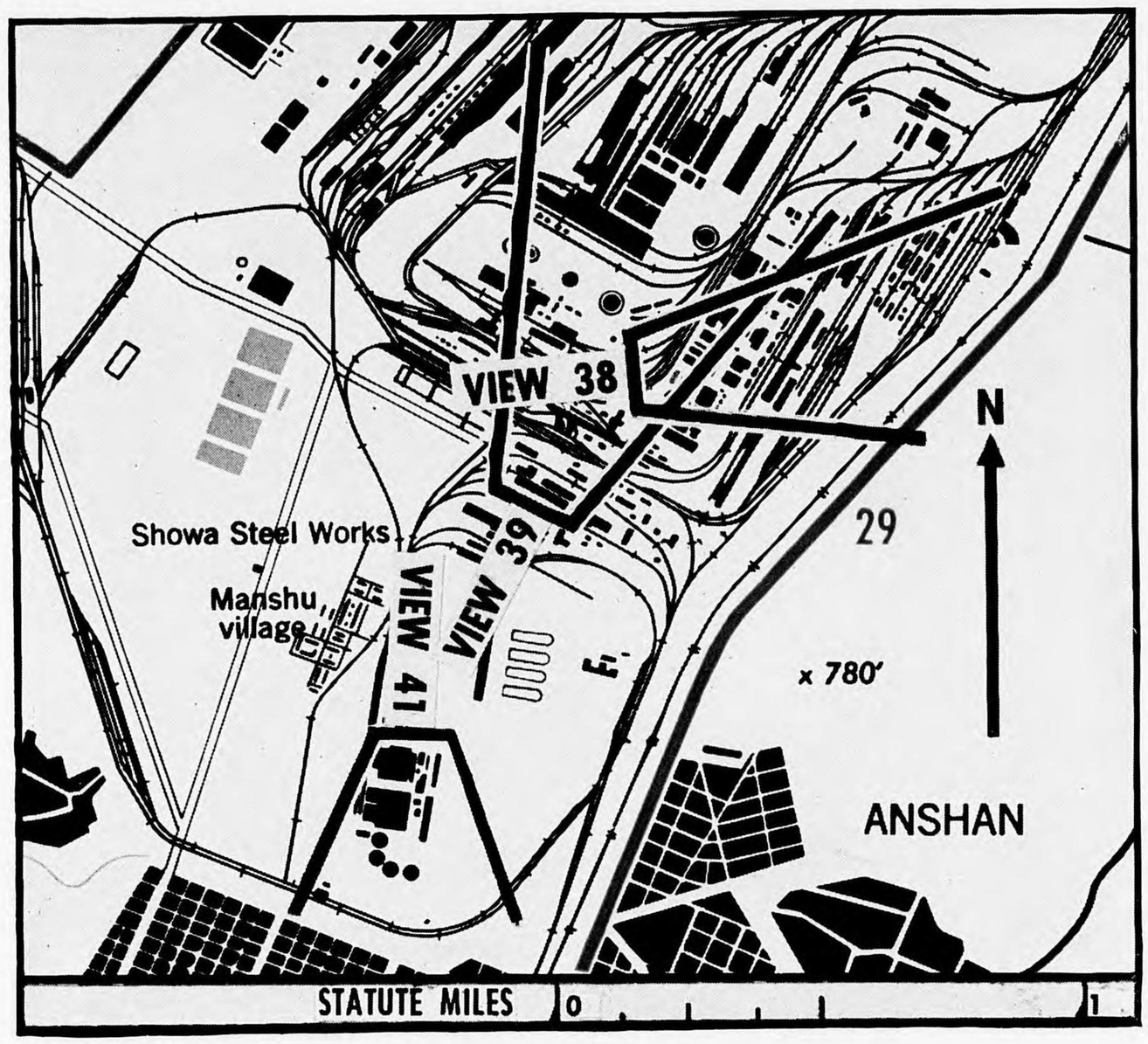


PHOTO 37 (right half)—Anshan—City of Anshan and TARGET 29 Showa Steel Works. (Also see page 32.)



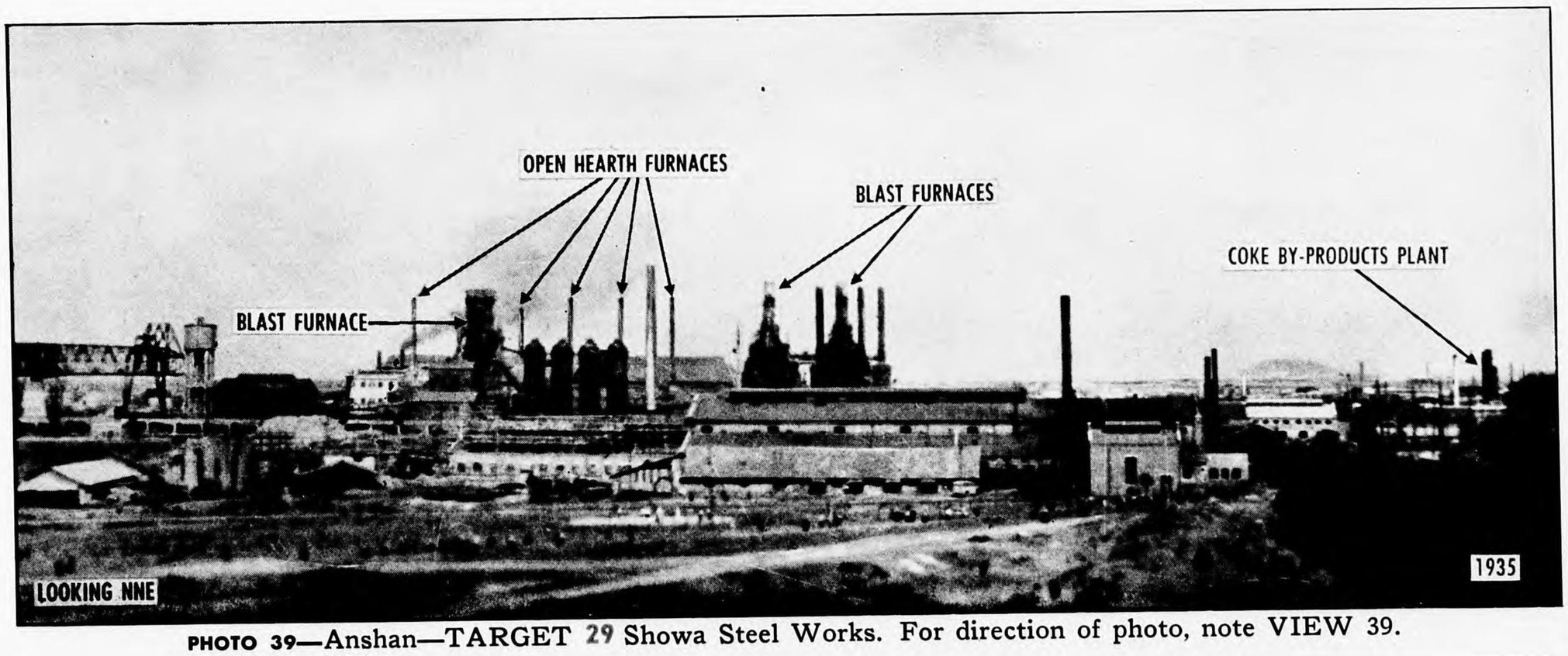


PHOTO 39—Anshan—TARGET 29 Showa Steel Works. For direction of photo, note VIEW 39.

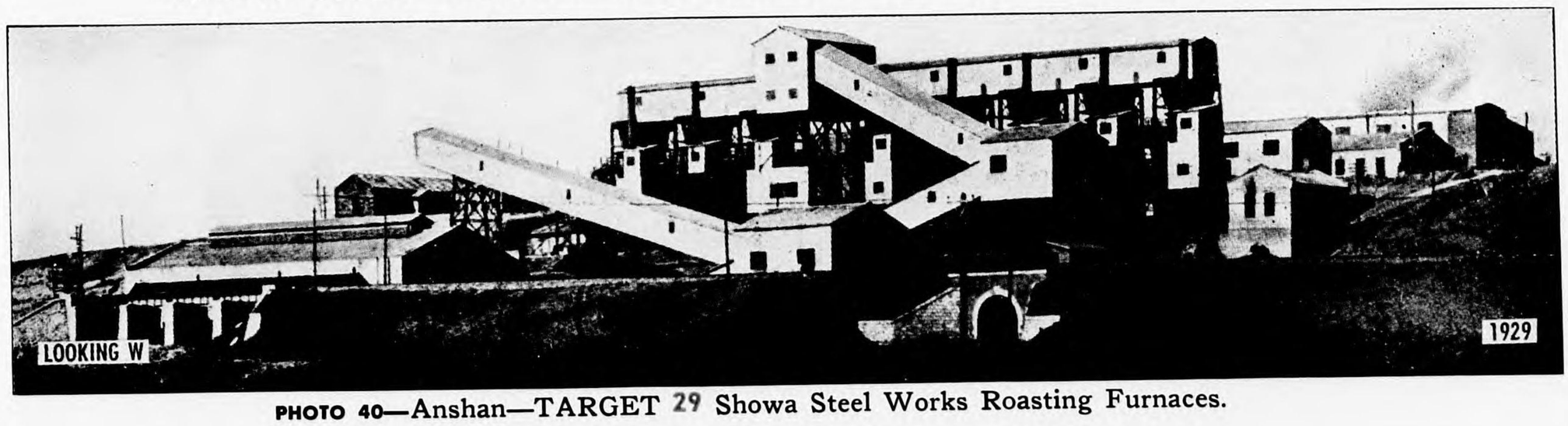


PHOTO 40—Anshan—TARGET 29 Showa Steel Works Roasting Furnaces.

3654—33—Manchuria—12-11-44—First Proof

MANCHURIA AREAS NOS. 93.1, 2, 3, 4, 5 GENERAL PHOTOS (ANSHAN REGION)

CONFIDENTIAL equals British Confidential

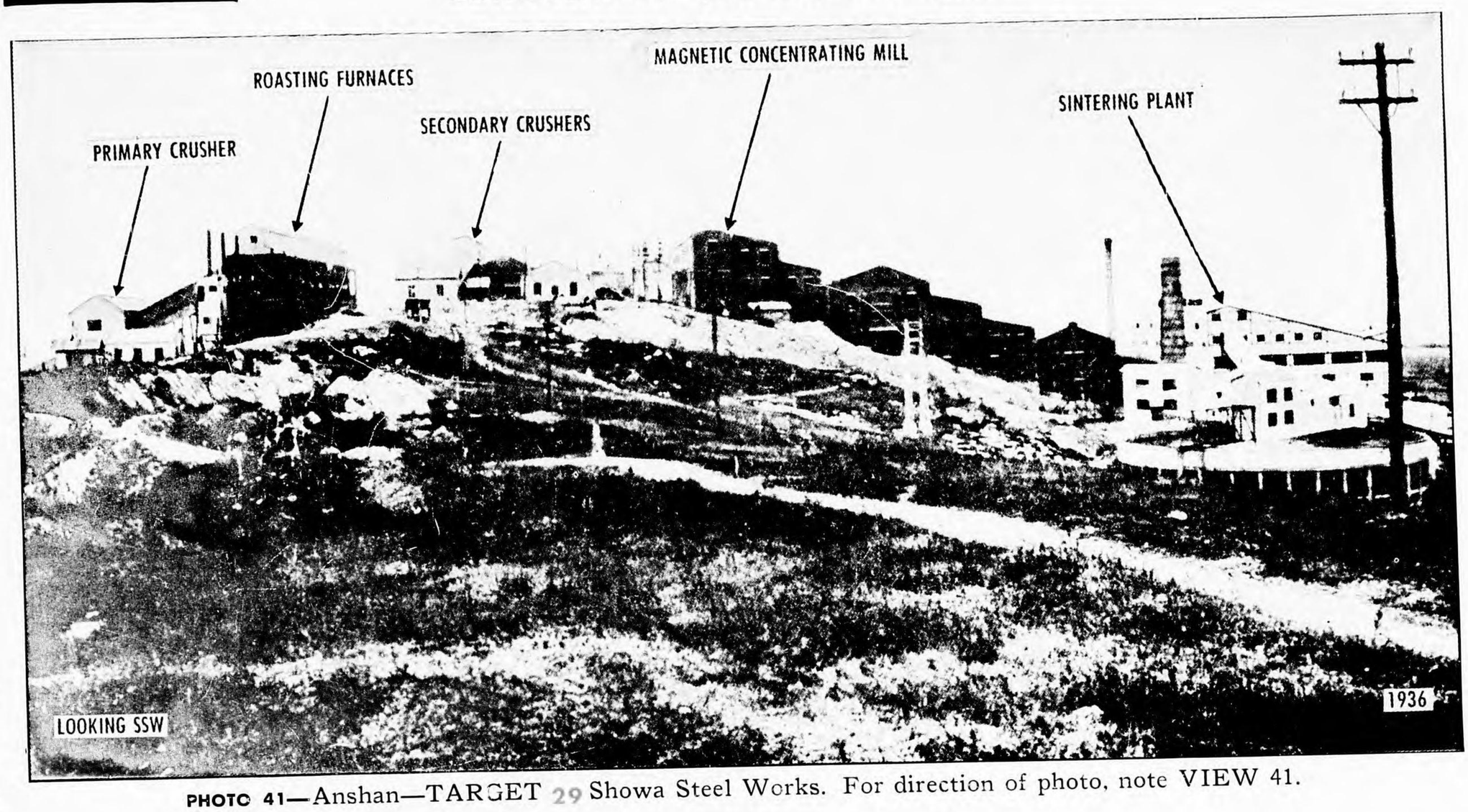
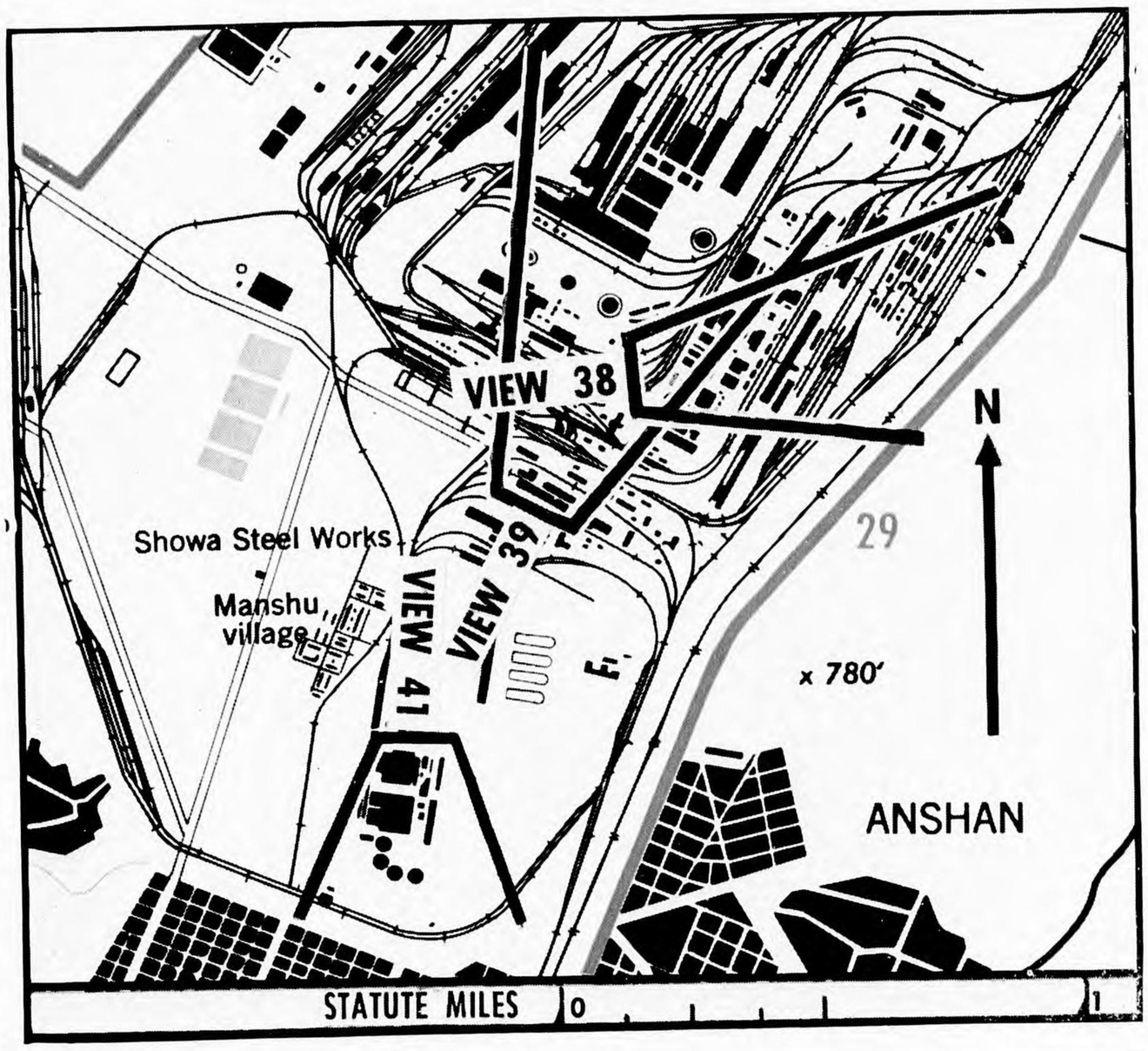


PHOTO 41—Anshan—TARGET 29 Showa Steel Works. For direction of photo, note VIEW 41.



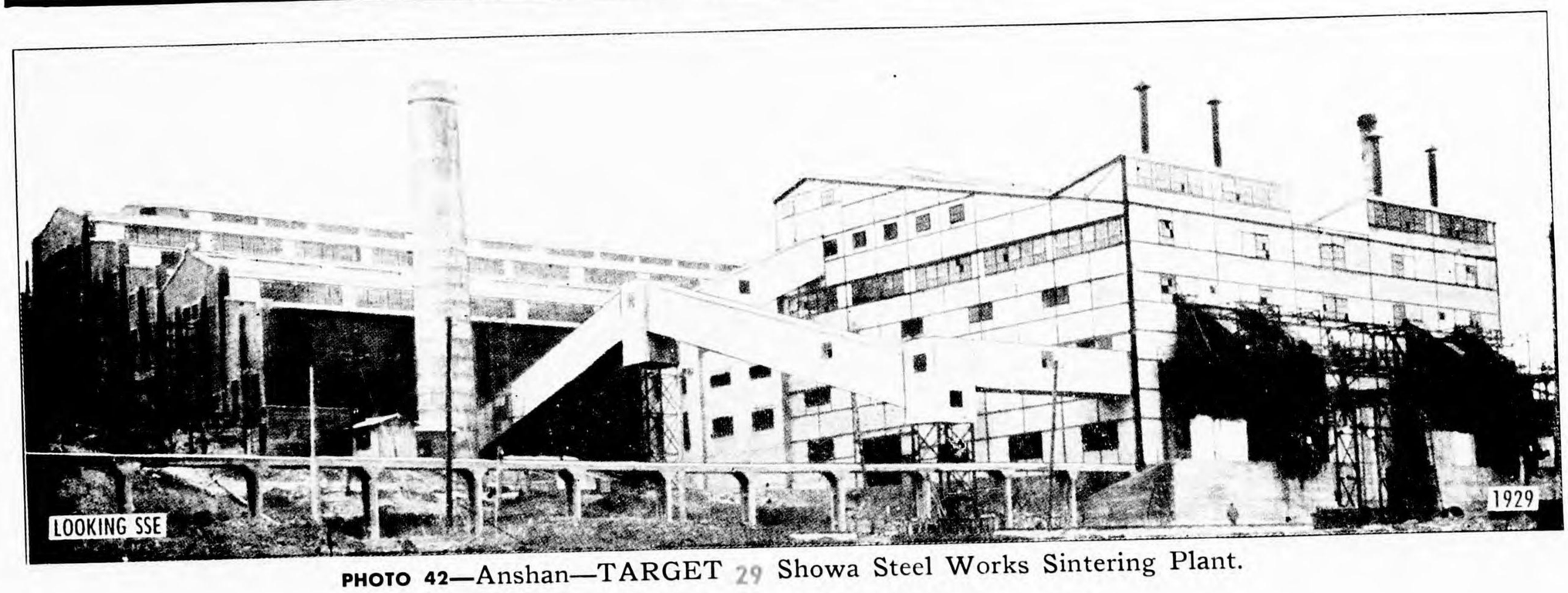


PHOTO 42—Anshan—TARGET 29 Showa Steel Works Sintering Plant.

CONFIDENTIAL equals British Confidential

MANCHURIA AREAS NOS. 93.1, 2, 3, 4, 5 GENERAL PHOTOS (ANSHAN REGION)

3654—34—Manchuria—12-11-44—First Proof

CONFIDENTIAL equals British Confidential

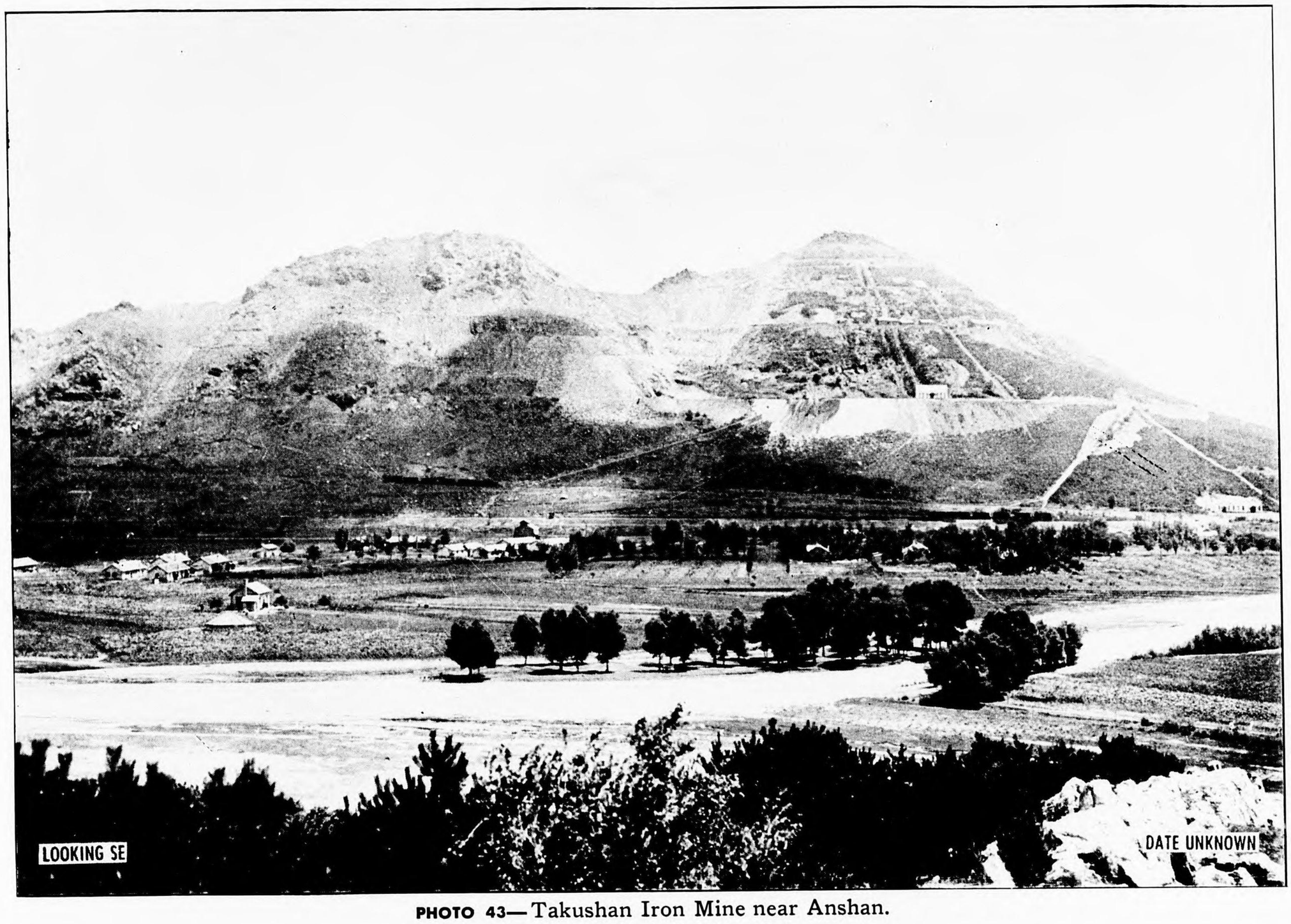


PHOTO 43— Takushan Iron Mine near Anshan.

MANCHURIA AREAS NOS. 93.1, 2, 3, 4, 5 GENERAL PHOTOS (ANSHAN REGION)

3654—35—Manchuria—12-11-44—First Proof

MANCHURIA AREAS NOS. 93.1, 2, 3, 4, 5 GENERAL PHOTOS (ANSHAN REGION)

CONFIDENTIAL equals British Confidential

CONFIDENTIAL equals British Confidential

Air Objective Folder
PENHSIHU REGION
MANCHURIA AREAS, Nos. 93.1, 2, 3, 4, 5

INDEX OF TARGETS BY NUMBER, CLASSIFICATION AND NAME

TARGET NUMBER	NAME	PAGE
	IRON AND STEEL	
30	Penhsihu Iron Works (Old Plant)	37
171	Penhsihu Iron Works (New Plant)	37

Summary and Evaluation of Penhsihu Region

Penhsihu, in the foothills 45 miles northeast of Anshan, is the center of an iron ore and coal region, has the second largest pig iron and coke installation on the Mainland, and is an important railroad junction for the iron and steel industry.

The two targets listed for the region are the Penhsihu Iron Works old plant **TARGET 30** and the more important new plant **TARGET 171** just south of the city. The new plant has the second largest pig iron capacity on the Mainland, and the third largest coking capacity in the Japanese Empire. Both plants, like Showa, use beneficiated low grade ores, a limited local production of high grade ores and high grade ores railed in from other mine areas. Local mines produce a limited quantity of good coal for metallurgical coke. At capacity operation the coke plant at the new plant produces a surplus which may be railed out for synthetic oil production. The old plant of the Penhsihu Iron Works **TARGET 30** lies directly across the Penhsihu River from the city. The target area is about a mile long with the blast furnaces, coke ovens, beneficiating plant grouped east of the railroad river bridge. To the west, are coal mine pits and coal handling equipment.

At Penhsihu, through traffic via Antung and the Korean coast trans-shipping ports opposite Japan, meets coal and ore moving to the Showa and Penhsihu works over the Fushun-Anshan line. The new line indicated under construction connects the Tunghua mining region with Anshan through Penhsihu and the railroad congestion at this junction area may be second only to Suchiatun Junction **TARGET 173** about 50 miles northwest.

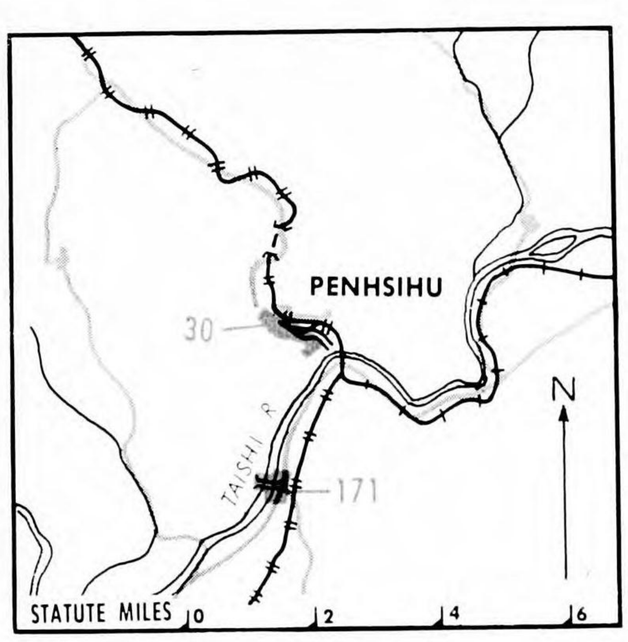
MANCHURIA AREAS NOS. 93.1, 2, 3, 4, 5 INDEX AND SUMMARY (PENHSIHU REGION)

3454 [illegible]

CONFIDENTIAL equals British Confidential

CONFIDENTIAL equals British Confidential

PHOTO 44 (left half)—Penhsihu—TARGET 30 Penhsihu Iron Works, Old Plant. For direction of photo, note VIEW 44. (Also see page 38.)



TARGET 93.3— 30

PENHSIHU IRON WORKS

(Old Plant)

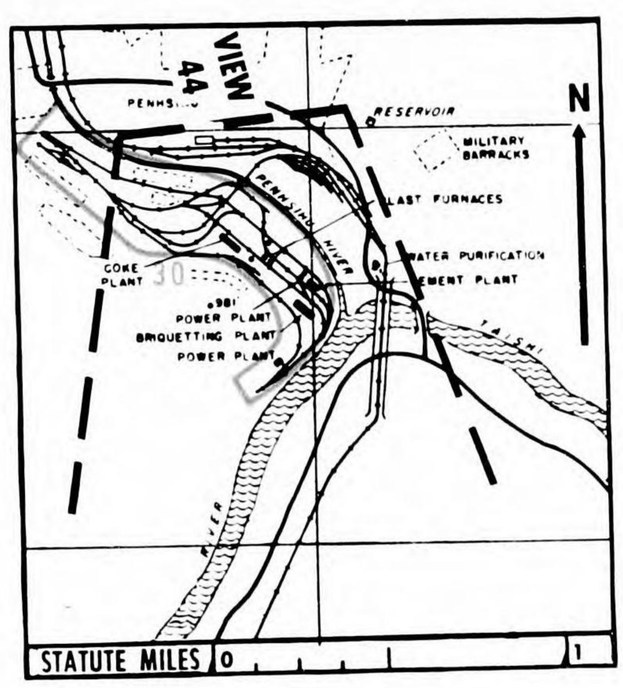
(Honkeiko Baitetsu Koshi KK)

PENHSIHU

(IRON AND STEEL)

41° 20′ N 123° 46′ E (Approx)—Original plant, in operation since 1925. Two blast furnaces, cap 145,000 metric tons; coke oven cap, 200,000 metric tons with by-products plant. Cement plant in target area (cap 100,000 tons) reported converted to produce 20,000 tons sponge iron. Two steam power plants and sulphuric acid plant. Approx two mi N of new plant (TARGET 171).

(See photos 44, 45, 46 and 47; map on page M-8.)



TARGET 93.3— 171

PENHSIHU IRON WORKS

(New Plant)

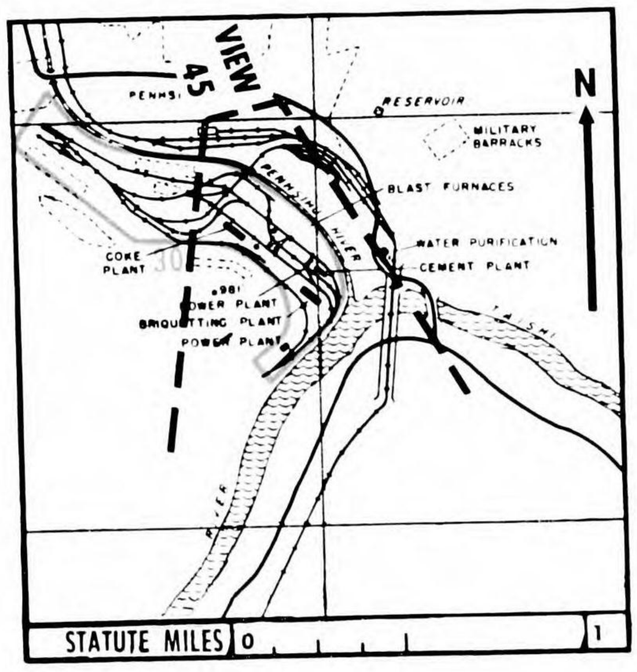
(Honkeiko Baitetsu Koshi KK)

MIYANOHARA

(IRON AND STEEL)

41° 18′ N 123° 46′ E (Approx)—Second largest pig iron cap on Mainland, and third largest coking cap in Japanese system. Two blast furnaces, cap 525,000 metric tons pig iron; coke oven cap, 1,700,000 metric tons with by-products plant. Approx two mi S of Penhsihu Old Plant (TARGET 30) on Mukden-Antung Mainline and on E bank of Taishi River. Connected by spur crossing river bridge to coal mines approx two mi W.

(See map on page M-8.)



MANCHURIA AREAS NOS. 93.1, 2, 3, 4, 5 TARGETS 30, 171 (PENHSIHU REGION)

3654—37—Manchuria—12-11-44—First Proof

CONFIDENTIAL equals British Confidential

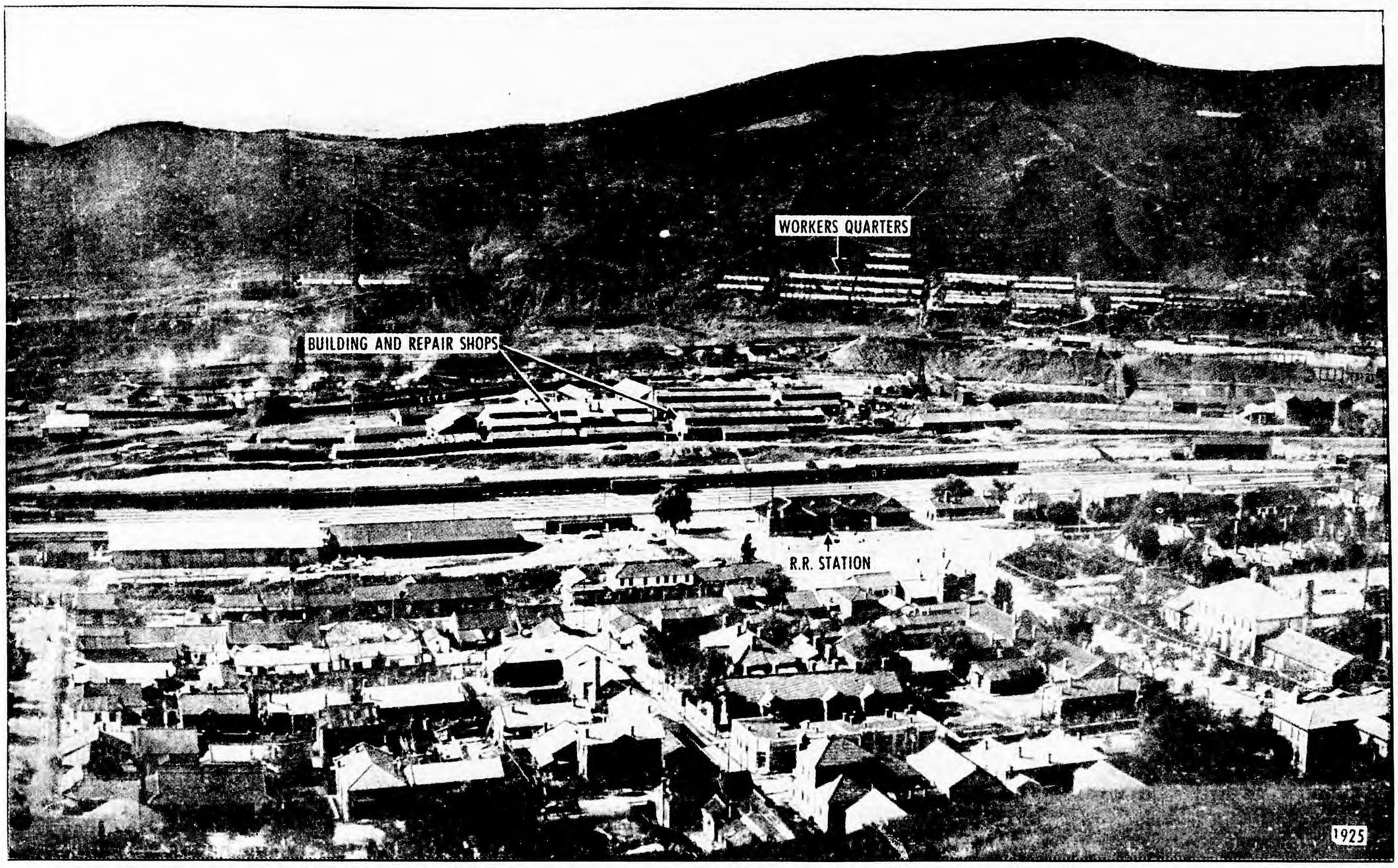


PHOTO 44 (right half)—Penhsihu—TARGET 30 Penhsihu Iron Works, Old Plant. For direction of photo, note VIEW 44. (Also see page 37.)

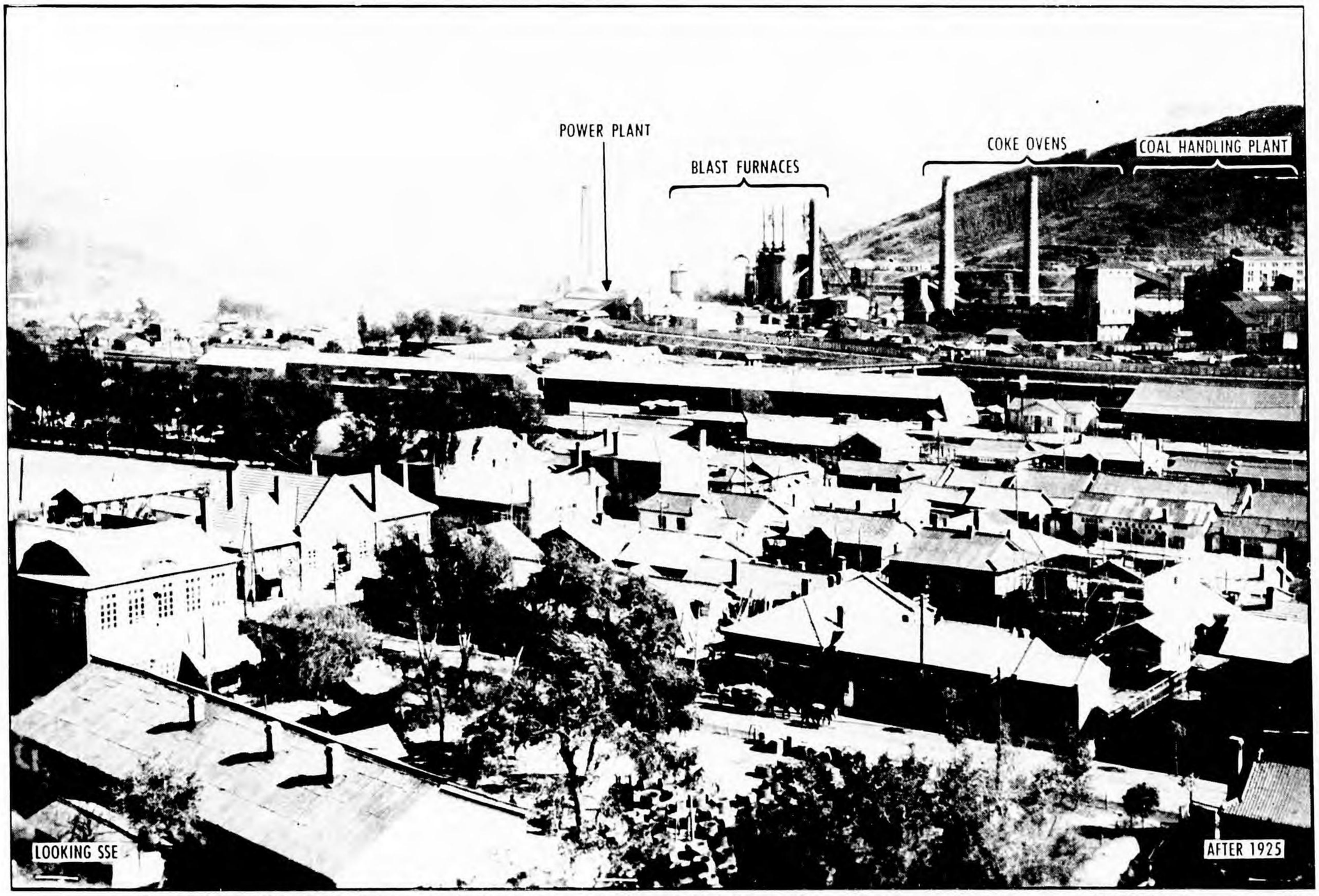


PHOTO 45—Penhsihu—TARGET 30 Penhsihu Iron Works, Old Plant. For direction of photo, see VIEW 45 on page 37.

MANCHURIA AREAS NOS. 93.1, 2, 3, 4, 5 GENERAL PHOTOS (PENHSIHU REGION)

3654—38—Manchuria—12-11-44—First Proof

CONFIDENTIAL equals British Confidential

CONFIDENTIAL equals British Confidential

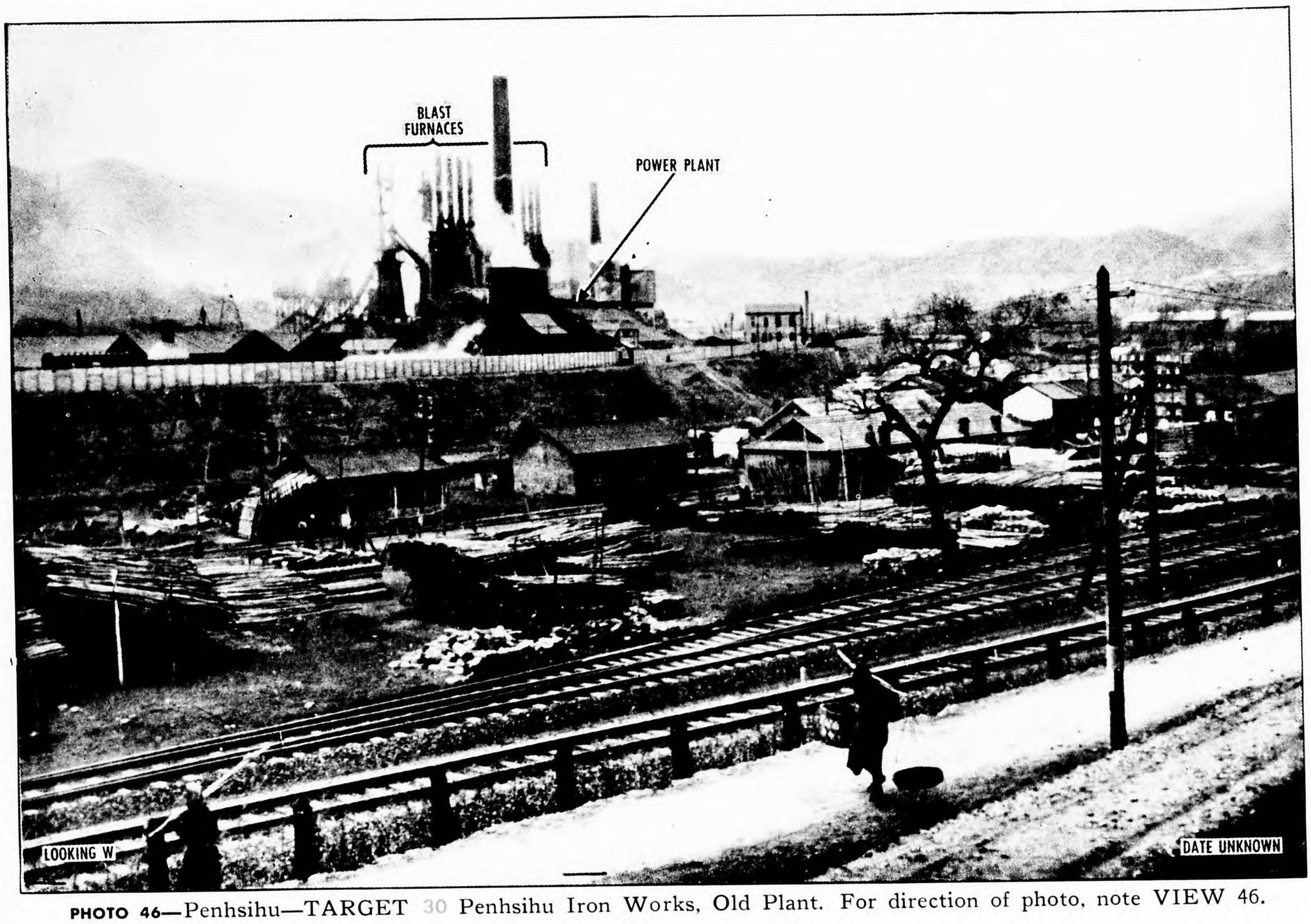
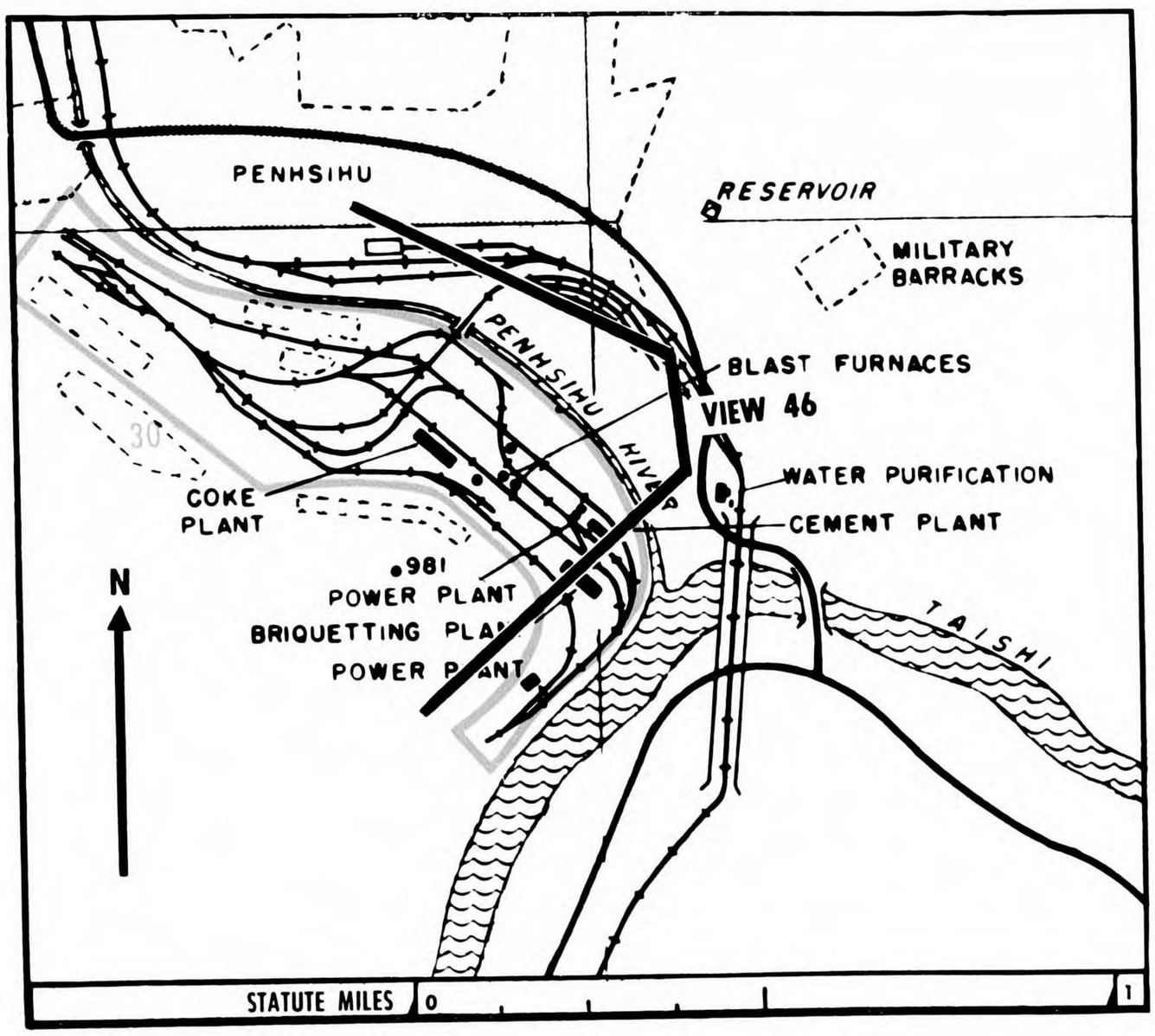


PHOTO 46—Penhsihu—TARGET 30 Penhsihu Iron Works, Old Plant. For direction of photo, note VIEW 46.



CONFIDENTIAL equals British Confidential

MANCHURIA AREAS NOS. 93.1, 2, 3, 4, 5 GENERAL PHOTOS (PENHSIHU REGION)

3654—39—Manchuria—12-11-44—First Proof

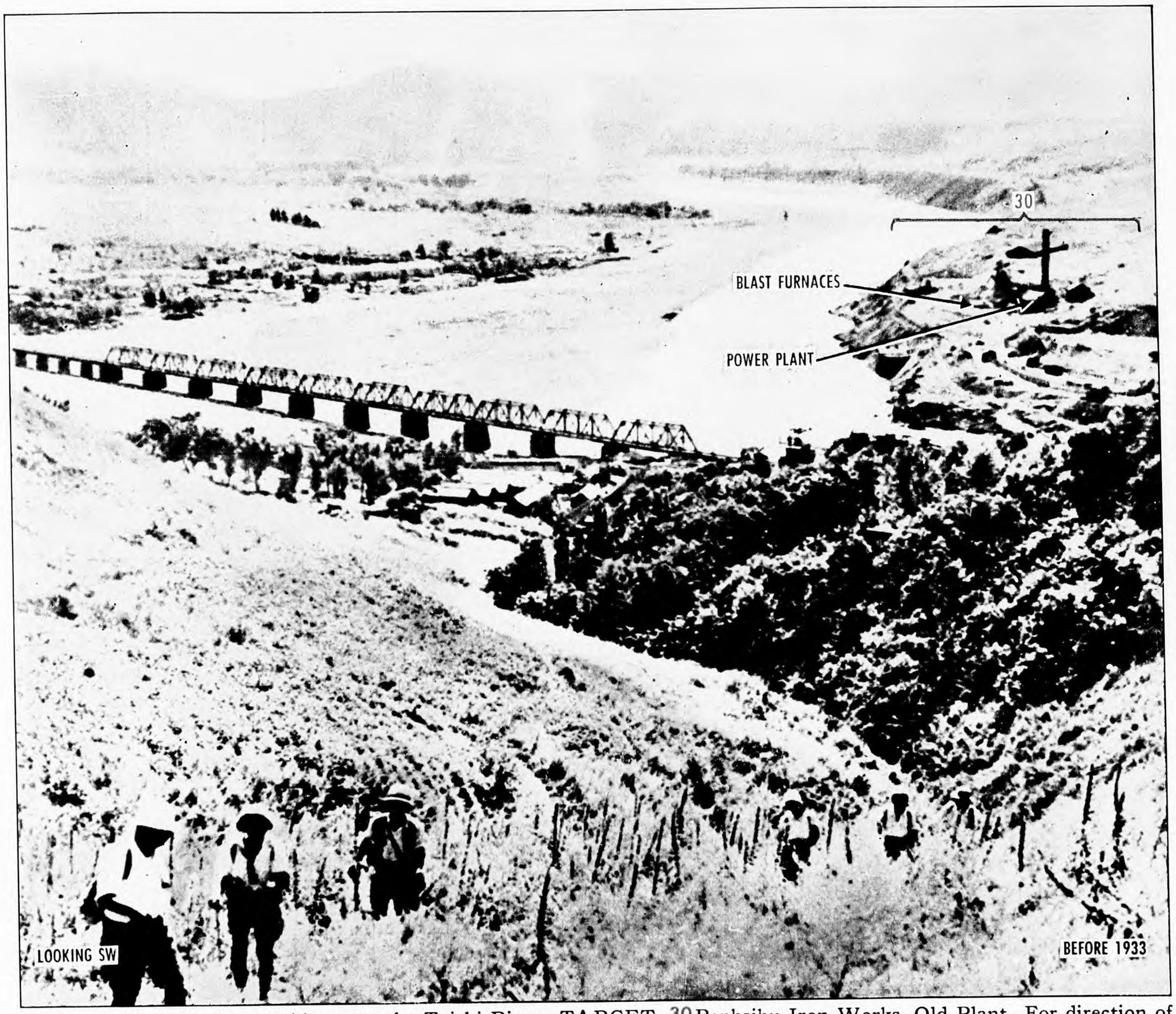
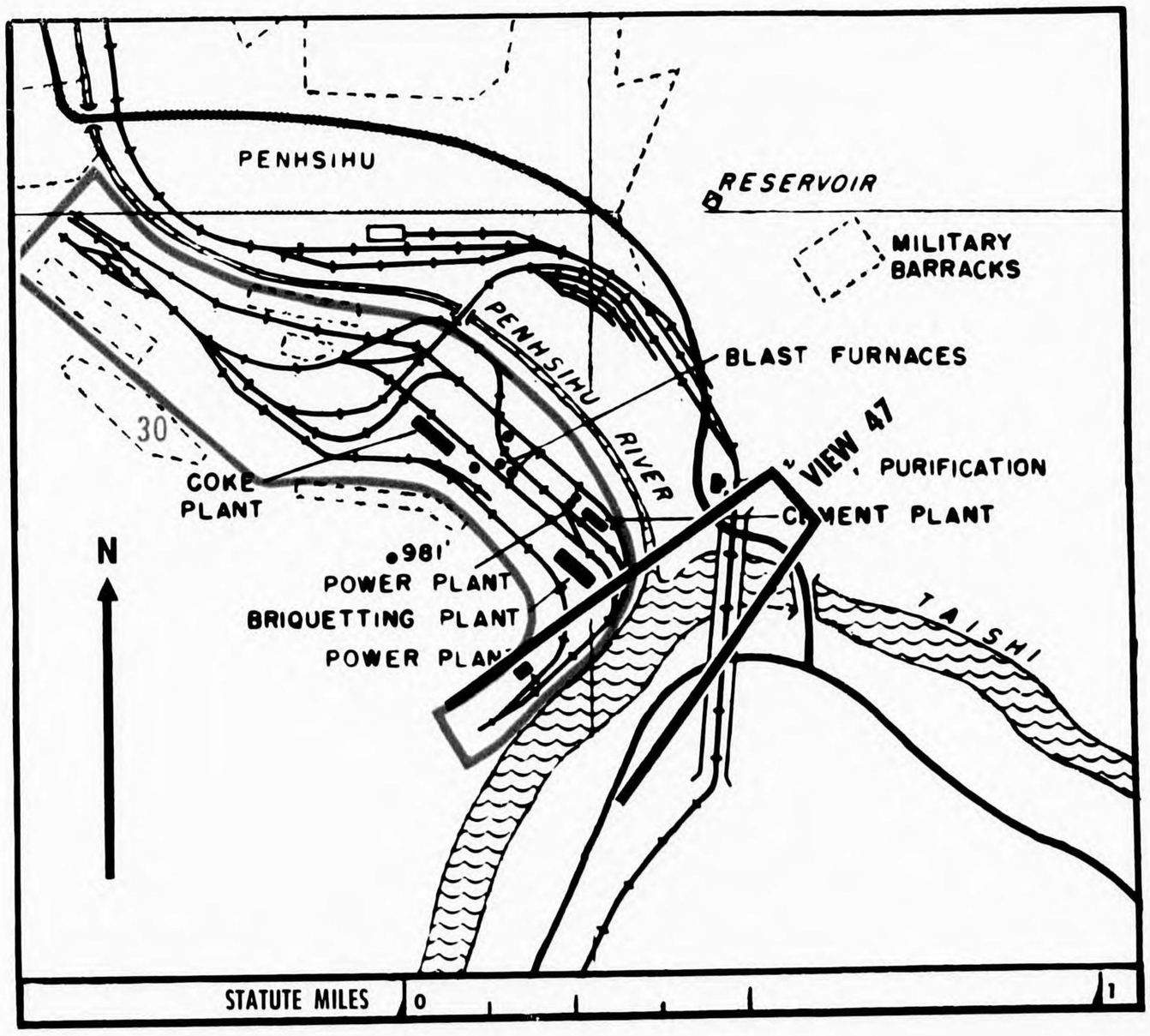


PHOTO 47—Penhsihu Iron Bridge over the Taishi River. TARGET 30 Penhsihu Iron Works, Old Plant. For direction of photo, note VIEW 47.



MANCHURIA AREAS NOS. 93.1, 2, 3, 4, 5 GENERAL PHOTOS (PENHSIHU REGION)

3654—40—Manchuria—12-11-44—First Proof

CONFIDENTIAL equals British Confidential

Air Objective Folder
MUKDEN REGION
MANCHURIA AREAS, Nos. 93.1, 2, 3, 4, 5

INDEX OF TARGETS BY NUMBER, CLASSIFICATION AND NAME

TARGET NUMBER	NAME	PAGE
	AIRCRAFT	
45	Manchuria Airplane Mfg. Co., Fuselage & Assembly Plant	44
177	Manchuria Airplane Mfg. Co., Engine Plant	44
	ARMS AND MUNITIONS	
46	Mukden Arsenal	44
166	Manchuria Iron Works	44
	ELECTRICAL EQUIPMENT	
52	Manchuria Electric Wire Co.	46
	MACHINES AND MACHINE TOOLS	
50	Sumitomo Metal Works	46
164	Manchuria Machine Tool Co.	46
165	Mukden Engineering Works	46
168	Oriental Steel Products Co.	46
170	Dairen Machinery Mfg. Co.	46
179	Kyowa Industrial Co.	46
182	Manchuria Hitachi Engineering Works	46
	RUBBER	
181	Oriental Tire Industry	46
	TRANSPORTATION	
53	Mukden RR Yards	46
173	Suchiatun RR Junction	45
178	Huangkutun RR Repair Shops	46
367	Hun River RR Bridge	45

Summary and Evaluation of Mukden Region

Mukden, the largest city in Manchuria, is an arsenal center and has the most extensive industrial concentration in the country. This concentration includes the Mukden Arsenal and a number of other large old-established concerns and numerous smaller, new plants. The city is also the hub of the Manchurian railway system with important junctions, terminal facilities, rolling stock manufacture and repair shops.

The Mukden Arsenal **TARGET 46,** one of the largest in the Japanese Empire, is a basic unit in the Kwantung Army's plan for military self-sufficiency. It controls the arms and munitions manufacture, and much of the machine tool and related operations that have been developed into the city's major industry in the past ten years. Dominating the old district east of the walled city, its compound extends along the highway leading east. West of the Arsenal is the old Manchuria Iron Works plant **TARGET 166,** one of the principal manufacturers for the army, with its more recent satellite, Manchuria Machine Tool Co. **TARGET 164,** adjoining to the north. The Manchuria Airplane Manufacturing Co. Plant No. 1 **TARGET 177** is located east of the Arsenal. The reported Plant No. 2 **TARGET 45** of this company is on the west side of the North Mukden Airport, beyond the Peiling Tombs north of the city. Southeast of the Arsenal is an airfield for testing and flying off complete planes from Plant No. 1.

In recent years an important new industrial district has been established in the area west of the new Mukden Railroad Yards **TARGET 53** and station. During the period March 1935 to the end of 1937, 144 factories were reported put into operation in this district. Included were 6 textile plants, 25 iron and steel plants, 20 machines and machine tool plants, 6 brick and tile factories, 16 chemical concerns, several electrical works, 5 lumber mills, and 15 miscellaneous factories. A 1941 report lists more than 191 plants concentrated in this district. Listed as targets are 7 installations manufacturing precision machines and tools, engines, iron and steel products, railroad and motorized equipment, electrical equipment, and ordnance and aircraft parts.

The Mukden Railroad Yards are the most exten-

3654—41—Manchuria—12-11-44—First Proof

SUMMARY AND EVALUATION OF MUKDEN REGION, MANCHURIA AREAS Nos. 93.1, 2, 3, 4, 5

sive in Manchuria, with a convergence of the mainlines from Fusan (Korea) through Antung, from Tientsin and Peking to the southwest, from Kirin, Hsinking and Harbin to the north.

There is a congestion of traffic extending from Mukden through Suchiatun Junction **TARGET 173,** nine miles to the south, the most important junction point in Manchuria. Lines from Mukden, Dairen, Antung (Fusan traffic), Fushun and Tunghua regions, converge. The extensive yards handle coal and ore for the Showa Steel Works **TARGET 29** in addition to the heavy mainline traffic. These two junction points are connected by the long Hun River Railroad Bridge **TARGET 367.**

On the Peking Line, north of the Mukden yards, are the old Huangkutun Railroad Repair Shops **TARGET 178** recently enlarged. The Manchuria Rolling Stock Co. also maintains a plant on the Peking Line in the northwest part of the city. It was reported expanded in 1942 with a capacity for building 100 locomotives, 100 passenger cars and 1500 freight cars.

Electric Power for Mukden industries is supplied principally from the large steam plants at Fushun **TARGET 35.**

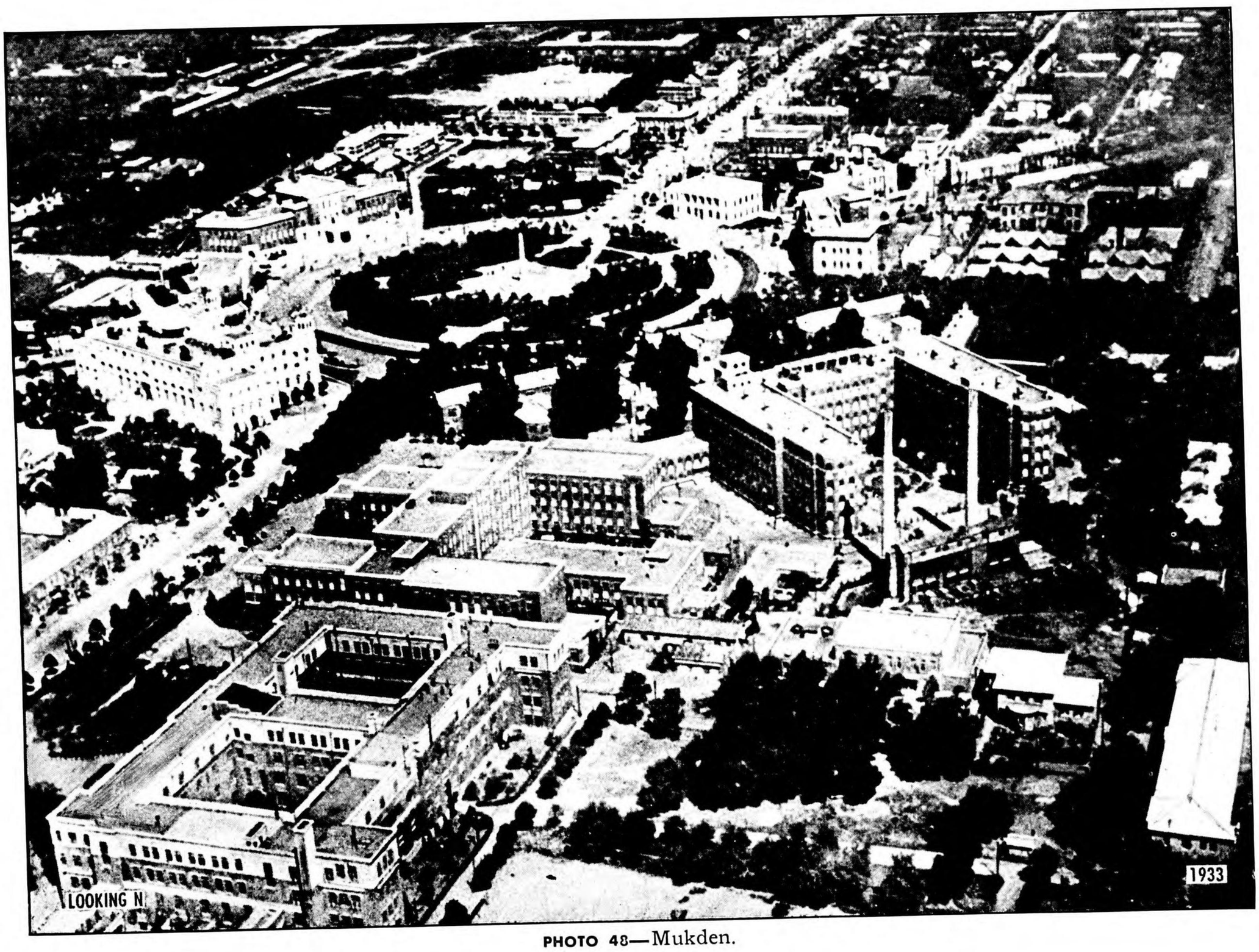


PHOTO 48—Mukden.

MANCHURIA AREAS NOS. 93.1, 2, 3, 4, 5 SUMMARY (MUKDEN REGION)

3654—42—Manchuria—12-11-44—First Proof

CONFIDENTIAL equals British Confidential

CONFIDENTIAL equals British Confidential

PHOTO 49—Mukden Military Airfield.

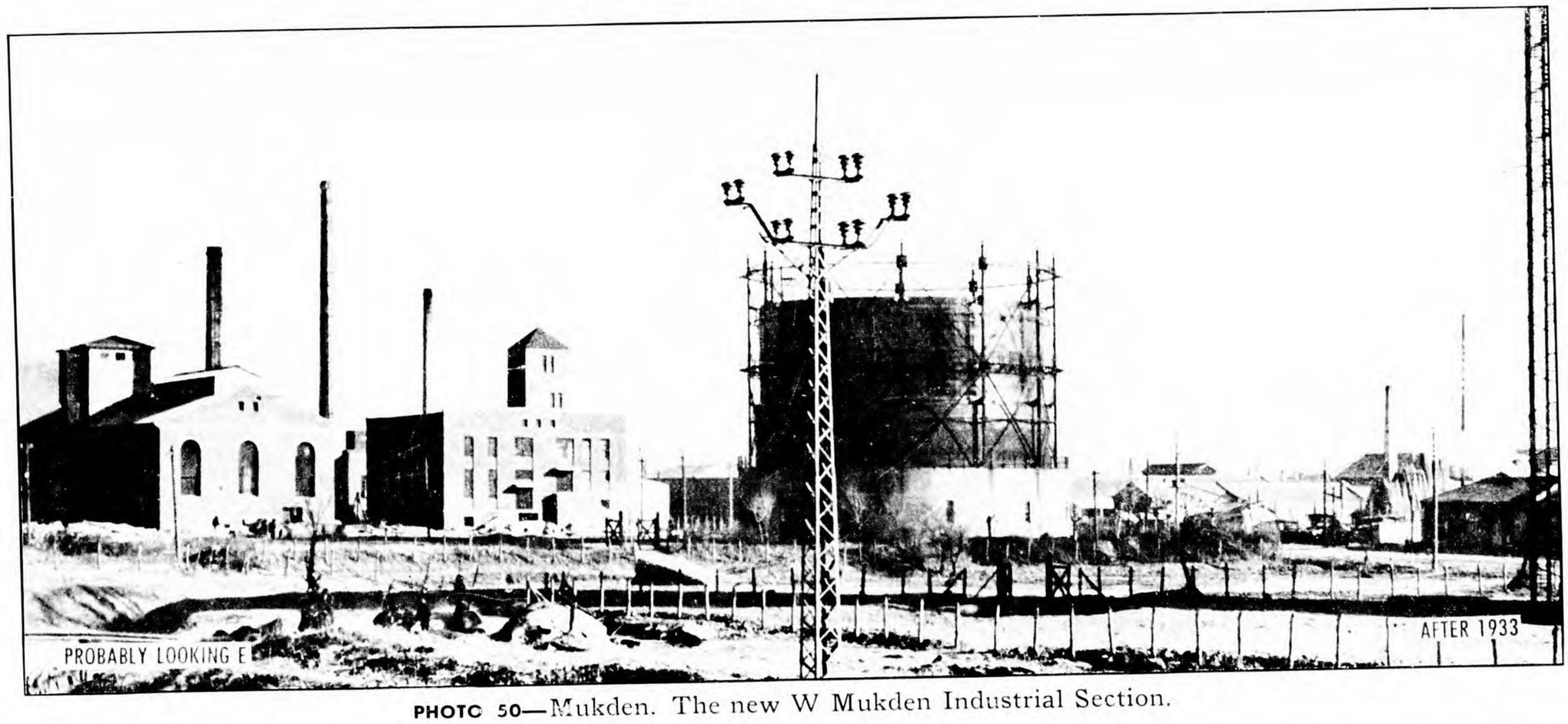


PHOTO 50—Mukden. The new W Mukden Industrial Section.

PHOTO 51—Mukden. The new W Mukden Industrial Area.

CONFIDENTIAL equals British Confidential

3654—43—Manchuria—12-11-44—First Proof

By LLR-MT NARA, Date 1/31/91

MANCHURIA AREAS NOS. 93.1, 2, 3, 4, 5 TARGETS 166, 177, 46, 45 (MUKDEN REGION)

CONFIDENTIAL equals British Confidential

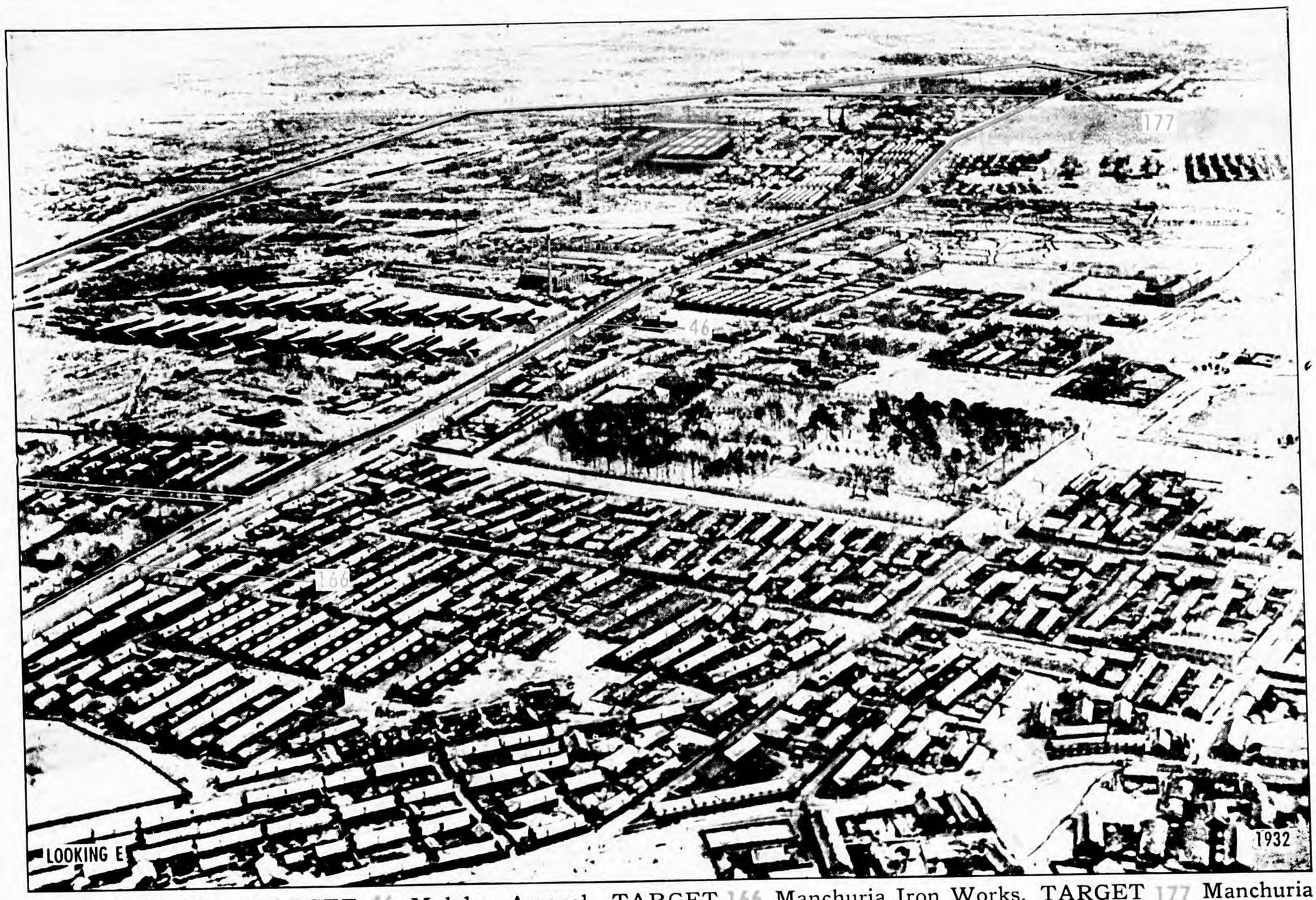
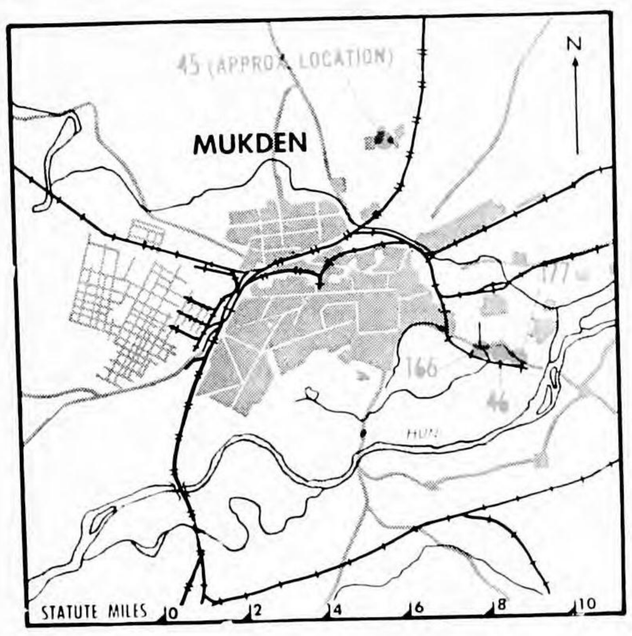


PHOTO 52—Mukden—TARGET 46 Mukden Arsenal. TARGET 166 Manchuria Iron Works. TARGET 177 Manchuria Airplane Manufacturing Co.



TARGET 93.3— 166

MANCHURIA IRON WORKS

(KK Manshu Kosho)

MUKDEN

(ARMS AND MUNITIONS)

41° 48′ N 123° 28′ E (Approx)—One of principal manufacturers for Kwantung Army in Manchuria. Reported best intergrated production of any shop in Mukden city. Gun-pointing gears, gun carriages, vehicles, flat cars, tank cars, gondolas, iron bridges, boilers, cast iron pipes, steel frames, water tanks, and other iron and steel products. Ten to twelve bldgs, mainly of brick or currugated metal construction. Includes foundry, three machine shops, forging shop, heavy sheet metal works, gun carriage assembly shop, several other bldgs. Plant area adjacent to and W of Mukden Arsenal (TARGET 46) adjacent to and S of Manchuria Machine Tool Co (TARGET 164).

(See photo 52; map on page M-9.)

TARGET 93.3— 46

MUKDEN ARSENAL

MUKDEN

(ARMS AND MUNITIONS)

41° 48′ N 123° 29′ E (Approx)—One of major Inner Zone ordnance plants. Largest and most important in Manchuria, Kwantung Army's Key unit in armament production in Mukden. Produces all types of weapons from small arms to 150 mm field guns; grenades, explosives and ammunition. Has own shell and cartridge filling plant. Also manufactures freight cars, frames, castings and parts. 10,000 KW power plant in compound. Plant area extends several mi along highway about 1.5 mi E of the walled city. Adjacent to and E of related plants of Manchuria Iron Works (TARGET 166) and Manchuria Machine Tool Co (TARGET 164).

(See photo 52; map on page M-9.)

TARGET 93.3— 177

MANCHURIA AIRPLANE MFG CO PLANT No. 1

(Manshu Hikoki Seizo KK)

MUKDEN

(AIRCRAFT)

41° 48′ N 123° 30′ E (Approx)—Reported producing aircraft engines; no details. Believed to occupy premises of the old Military Academy, adjacent to and E of Mukden Arsenal (TARGET 46).

(See photo 52; map on page M-9.)

TARGET 93.3— 45

MANCHURIA AIRPLANE MFG CO PLANT No. 2

(Manshu Hikoki Seizo KK)

MUKDEN

(AIRCRAFT)

41° 51′ N 123° 26′ E (Approx)—Reported large, with facilities for assembling aircraft, repairs, parts components production. No confirmed estimates of number and types aircraft produced. Located N of the city, immediately N of large airport. Large plant with no other installations in vicinity.

(See map on page M-9.)

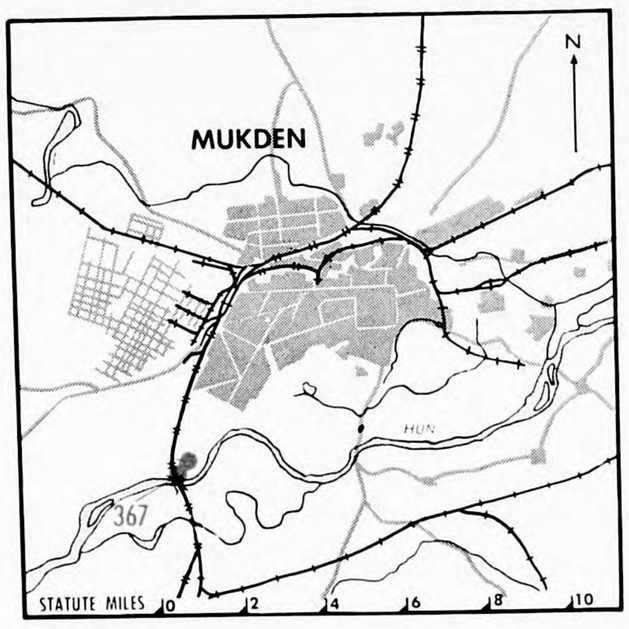
MANCHURIA AREAS NOS. 93.1, 2, 3, 4, 5 TARGETS 166, 177, 46, 45 (MUKDEN REGION)

CONFIDENTIAL equals British Confidential

3654—44—Manchuria—12-11-44—First Proof

CONFIDENTIAL equals British Confidential

PHOTO 53—TARGET 367 Hun River RR Bridge, S of Mukden.

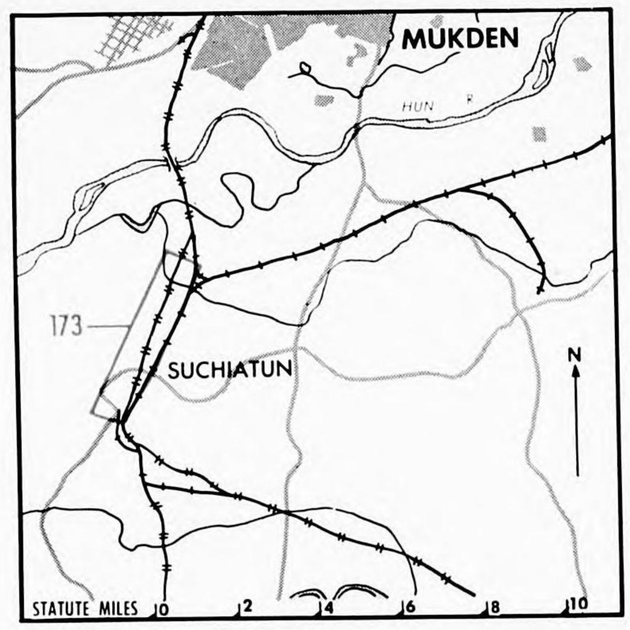


TARGET 93.3— 367

HUN RIVER RR BRIDGE
MUKDEN
(TRANSPORTATION)

41° 45′ N 123° 23′ E (Approx)—Long bridge over Hun River between Mukden and Suchiatun Junction. Carries heavy traffic between Mukden and Dairen, and Mukden-Antung.

(See photos 53 and 54; map on page M-9.)



TARGET 93.3— 173

SUCHIATUN RR JUNCTION
SUCHIATUN
(TRANSPORTATION)

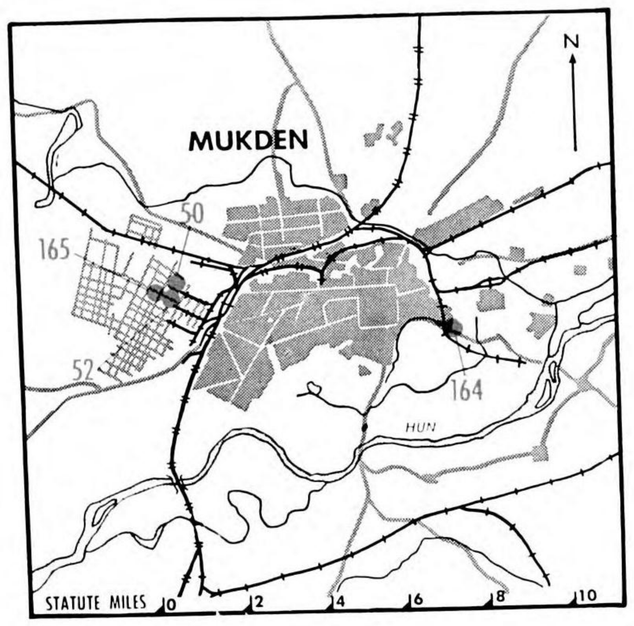
41° 40′ N 123° 21′ E (Approx)—Most important junction point in Manchuria. Lines from Mukden, Dairen, Antung and Fushun converge. Extensive freight yards handle Fushun coal to Anshan and heavy main line traffic between Mukden-Dairen and Mukden-Korea. Roundhouse.

(See map on page M-9.)

PHOTO 54—TARGET 367 Hun River RR Bridge, S of Mukden.

CONFIDENTIAL equals British Confidential

5654—45—Manchuria—12-11-44—First Proof



TARGET
93.3—
50

SUMITOMO METAL WORKS

(Manshu Sumitomo Kinzoku Kogyu KK)

MUKDEN

(MACHINES & MACHINE TOOLS)

41° 48′ N 123° 22′ E (Approx)—Equipped to manufacture wheels, bearings, and axles for railway rolling stock, locomotive boiler tubes, mining machinery, steel tubing. Plant area covers about 20,000 sq ft in N part of new W Mukden industrial district.

(See map on page M-9.)

TARGET
93.3—
52

MANCHURIA ELECTRIC WIRE CO

(Manshu Densen KK)

MUKDEN

(ELECTRICAL EQUIPMENT)

41° 48′ N 123° 22′ E (Approx)—Produces copper wire and cables. Located in new W Mukden industrial section.

(See map on page M-9.)

TARGET
93.3—
164

MANCHURIA MACHINE TOOL CO

(Manshu Kosaku Kikai KK)

MUKDEN

(MACHINES & MACHINE TOOLS)

41° 48′ N 123° 28′ E (Approx)—Began operations in 1940 with monopoly of Manchurian machine tool industry. Sponsored by Manchuria Iron Works (TARGET 166.) Equipped to manufacture machine tools, lathes, boring mills, planers, gear cutters, milling machines, grinders, etc., steam engines, boilers, internal combustion engines. Includes foundry, three machine shops, forging and heat treating shop, power house and boiler room, office bldgs. Plant bldgs of concrete and brick construction. Located adjacent to and N of Manchuria Iron Works (TARGET 166), adjacent to and W of Mukden Arsenal (TARGET 46).

(See map on page M-9.)

TARGET
93.3—
165

MUKDEN ENGINEERING WORKS

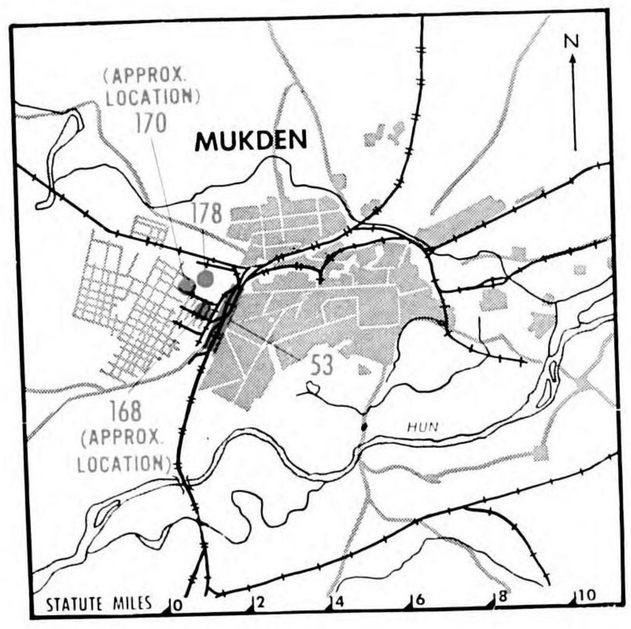
(KK Hoten Seisakusho)

MUKDEN

(MACHINES & MACHINE TOOLS)

41° 49′ N 123° 22′ E (Approx)—Produces machines and electrical equipment. Located in new W Mukden industrial district.

(See map on page M-9.)



TARGET
93.3—
53

MUKDEN RR YARDS

MUKDEN

(TRANSPORTATION)

41° 47′ N 123° 23′ E (Approx)—Most extensive freight yards in Manchuria, serving the hub of the SMR system. Lines from Shanhaikuan, Dairen, Antung, Kirin, and Hsinking converge here. Adjacent to main Mukden station.

(See map on page M-9.)

TARGET
93.3—
168

ORIENTAL STEEL PRODUCTS CO

MUKDEN

(MACHINES & MACHINE TOOLS)

41° 48′ N 123° 22′ E (Approx)—Moderately large, well equipped machine shop. Manufactures mine cars, concrete mixers, and similar heavy equipment. Reported converted to Army tank parts and tank repair work. Located in new W Mukden industrial section.

(See map on page M-9.)

TARGET
93.3—
170

DAIREN MACHINERY MFG CO

(Dairen Kikai Seisakusho)

MUKDEN

(MACHINES & MACHINE TOOLS)

41° 48′ N 123° 22′ E (Approx)—New machine shop reported to produce RR rolling stock, automobile bodies, lathes, tractors, aircraft parts. 1939 reports indicate 20% of total production devoted to aircraft parts. Located in New W Mukden industrial district.

(See map on page M-9.)

TARGET
93.3—
178

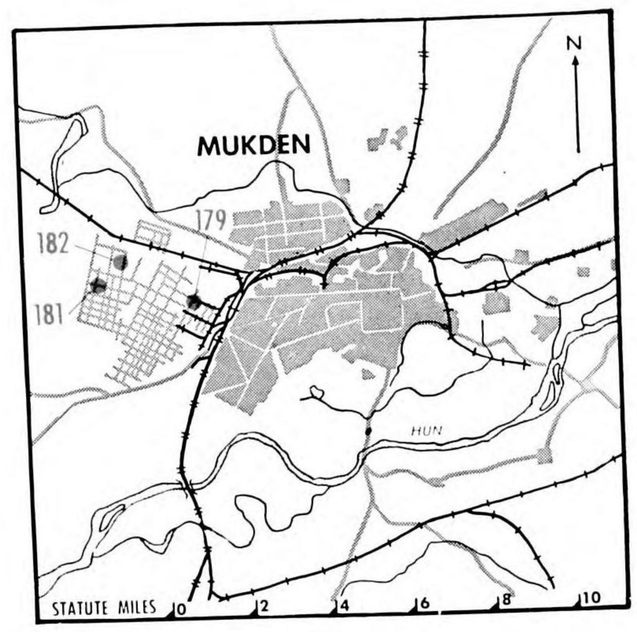
HUANGKUTUN RR REPAIR SHOPS

MUKDEN

(TRANSPORTATION)

41° 49′ N 123° 23′ E (Approx)—Old repair shops of Mukden-Peking line, believed to have been recently renovated and enlarged. Now principally repairs cars. Located at the Huangkutun station of the Peking line in NW part of city. Locomotives now repaired at large new shops at Suchiatun (TARGET 173).

(See map on page M-9.)



TARGET
93.3—
179

KYOWA INDUSTRIAL CO

(Kyowa Kogyo KK)

MUKDEN

(MACHINES & MACHINE TOOLS)

41° 49′ N 123° 22′ E (Approx)—Machine shop established in 1937. Manufactures precision machines, bicycles, and parts for aircraft and ordnance. Located in new W Mukden industrial district.

(See map on page M-9.)

TARGET
93.3—
181

ORIENTAL TIRE INDUSTRY

(Toyo Tire Kogyo KK)

MUKDEN

(RUBBER)

41° 47′ N 123° 21′ E (Approx)—New plant. 1939 reported production 8000 tires monthly. Planned to increase production to 220,000 tires and 1500 tons of re-manufactured rubber. Located in new W Mukden industrial district.

(See map on page M-9.)

TARGET
93.3—
182

MANCHURIA HITACHI ENGINEERING WORKS

(KK Manshu Hitachi Seisakusho)

MUKDEN

(MACHINES & MACHINE TOOLS)

41° 49′ N 123° 22′ E (Approx)—New plant of one of Japan's leading machinery electrical equipment firms. Manufactures machine tools, electrical and general machinery. Located in new W Mukden industrial district.

(See map on page M-9.)

MANCHURIA AREAS NOS. 93.1, 2, 3, 4, 5 TARGETS 50, 52, 164, 165, 53, 168, 170, 178, 179, 181, 182 (MUKDEN REGION)

3654—46—Manchuria—12-11-44—First Proof

CONFIDENTIAL equals British Confidential

50, 52, 164, 165, 53, 168, 170, 178, 179, 181, 182

CONFIDENTIAL equals British Confidential

Air Objective Folder
FUSHUN REGION
MANCHURIA AREAS, Nos. 93.1, 2, 3, 4, 5

INDEX OF TARGETS BY NUMBER, CLASSIFICATION AND NAME

TARGET NUMBER	NAME	PAGE
	CHEMICALS	
62	SMR Sulphuric Acid Plant	52
	ELECTRIC POWER	
35	Taikanton Steam Power Plants	50
	NON-FERROUS METALS	
32	Manchuria Light Metals Co., Fushun Plant	52
	PETROLEUM	
40	SMR Shale Oil Plant	48
41	SMR Coal Liquefaction Plant	52
	TRANSPORTATION	
63	Fushun RR Yards & Repair Shops	51

Summary and Evaluation of Fushun Region

The South Manchurian Railway Shale Oil Plant **TARGET 40,** rated the most important source of oil in the Inner Zone, is at the Fushun mines 25 miles east of Mukden. This concentrated mining area is known to produce more than one-third of the estimated current Manchurian coal output. The coal is mined from extensive open-cuts and the Ryuho shaft, in a 10-mile strip along the south bank of the Hun River. The open-cuts are mechanized and the Ryuho shaft, producing about 1,500,000 tons, has the most elaborate coal mining equipment in the world. The coal is non-coking with the exception of a small part of the Ryuho production.

The shale oil plant was put into operation in 1930 to exploit the shale overburden from the open-cut mines. Production for 1944 is estimated at approximately 2,000,000 barrels, or 10 per cent of Inner Zone output.

The Taikanton Steam Power Plants **TARGET 35** just east of the shale oil plant, the largest steam power plant in the country, is of great importance to the industries of south-central Manchuria. Power from the three adjacent units of this plant operates the coal mines and industries at Fushun, and is transmitted to Mukden and the Showa Steel Works **TARGET 29** at Anshan. A Portland cement plant with an estimated 300,000-ton capacity lies west of the shale oil plant.

A new industrial concentration has been developed about four miles west of the shale oil plant on the west side of the Kojoshi River and just south of the South Manchurian Railway tracks. This is the location of the South Manchurian Railway Coal Liquefaction Plant **TARGET 41,** which is reported to produce about 60,000 barrels of oil. West of the coal liquefaction plant is the compound of the Manchuria Light Metals Co. **TARGET 32.** It has a large alumina and aluminum plant, and includes the large magnesium plant of this company.

North across the railroad tracks is an extensive modern housing development for the Japanese employees in this district.

The Fushun mines and related plants are connected by rail with Suchiatun Railroad Junction **TARGET 173** and the Showa Steel Works via Penhsihu. Capacity production of coal, shale and by-products requires the handling by local railroad yards, mine lines, and plant spurs of some 40,000,000 tons a year.

The alternate Mukden-Kirin single-tracked railroad via the Hun River Valley and Meihokou junction, follows the north bank of the river and passes opposite Fushun. This line, not connected with the Fushun side by a railroad bridge, is a northern loop between the Tunghua iron ore mines and the Showa and Penhsihu steel works.

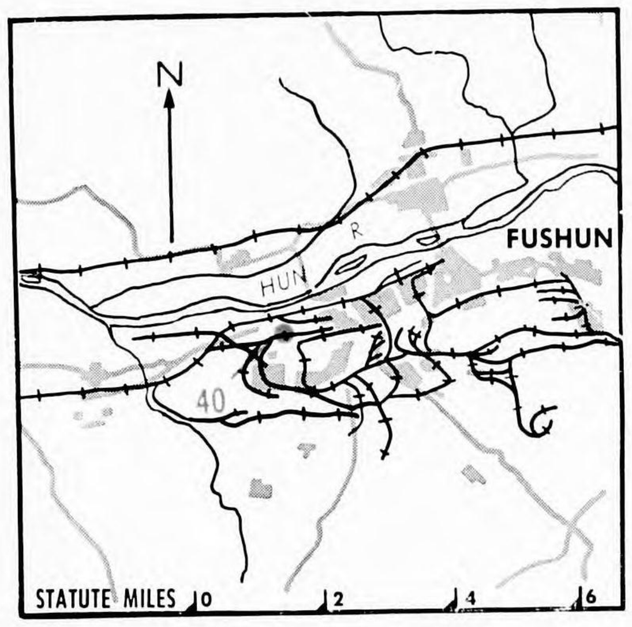
3654—47—Manchuria—12-11-44—First Proof

CONFIDENTIAL equals British Confidential

MANCHURIA AREAS NOS. 93.1, 2, 3, 4, 5 INDEX AND SUMMARY (FUSHUN REGION)

PHOTO 55—Fushun—TARGET 40 SMR Shale Oil Plant.

MANCHURIA AREAS NOS. 93.1, 2, 3, 4, 5 TARGET 40 (FUSHUN REGION)



TARGET 93.3— 40

SMR SHALE OIL PLANT

FUSHUN

(PETROLEUM)

41° 51′ N 123° 51′ E (Approx)—Rated the most important source of oil in the Inner Zone. Estimated 10% of Inner Zone production. Began operations in 1930 and reported to have been steadily expanded, with 1944 production from nearby oil-bearing shale estimated at approx 2,000,000 bbls. Product refined into fuel oil and lowgrade motor fuel. Refining cap not known. Plant includes units for distillation of oil, gas, and fixed carbon from shale; boiler still plant for refining the crude oil: 2 Dubbs cracking plants; by-products finishing plant.

(See photos 55, 56, 57, 58, 59 and 61; map on page M-10.)

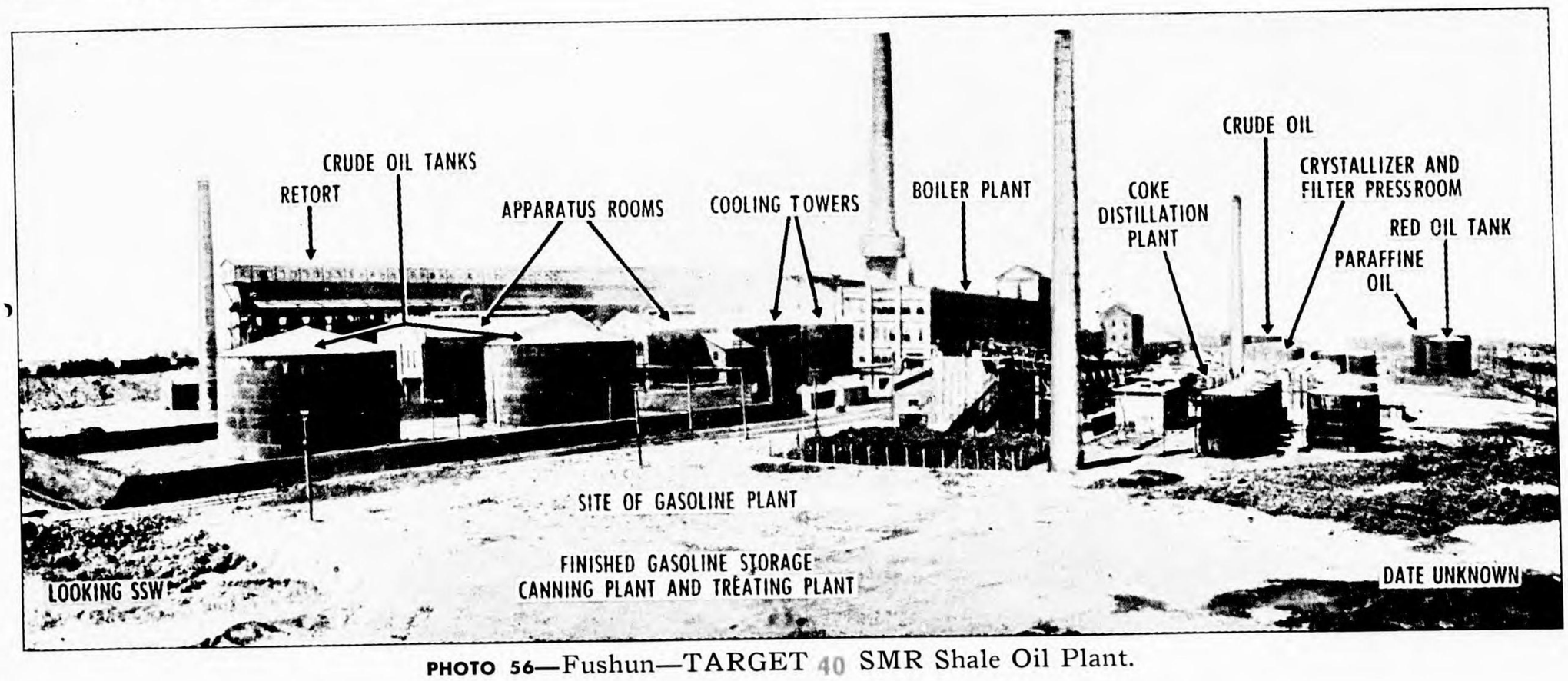


PHOTO 56—Fushun—TARGET 40 SMR Shale Oil Plant.

CONFIDENTIAL equals British Confidential

3654—48—Manchuria—12-11-44—First Proof

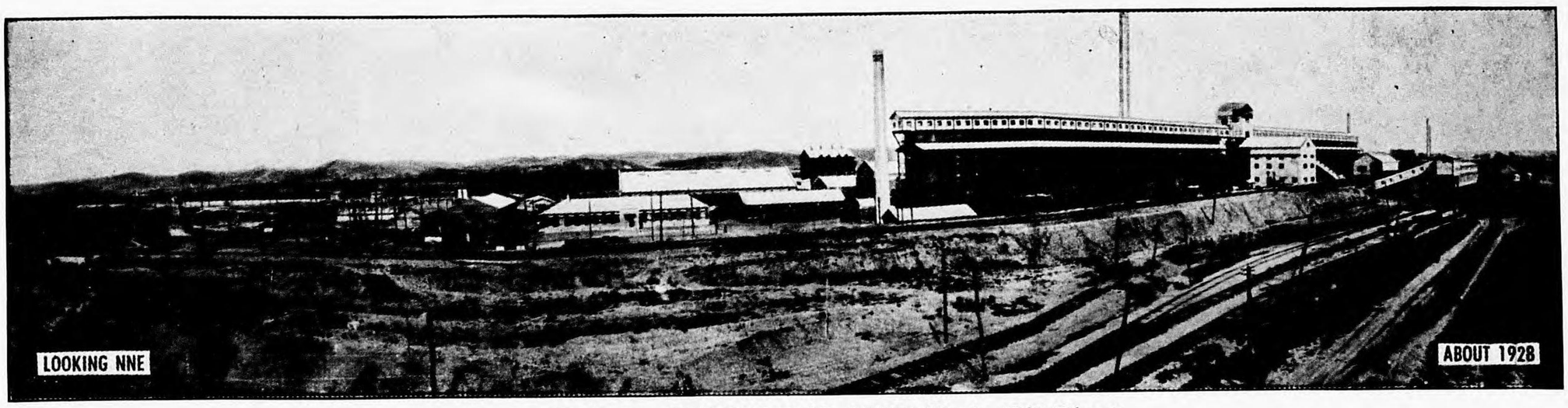


PHOTO 57—Fushun—TARGET 40 SMR Shale Oil Plant.

PHOTO 58—Fushun—TARGET 40 SMR Shale Oil Plant.

PHOTO 59—Fushun—TARGET 40 SMR Shale Oil Plant.

MANCHURIA AREAS NOS. 93.1, 2, 3, 4, 5 GENERAL PHOTOS (FUSHUN REGION)

3654—49—Manchuria—12-11-44—First Proof

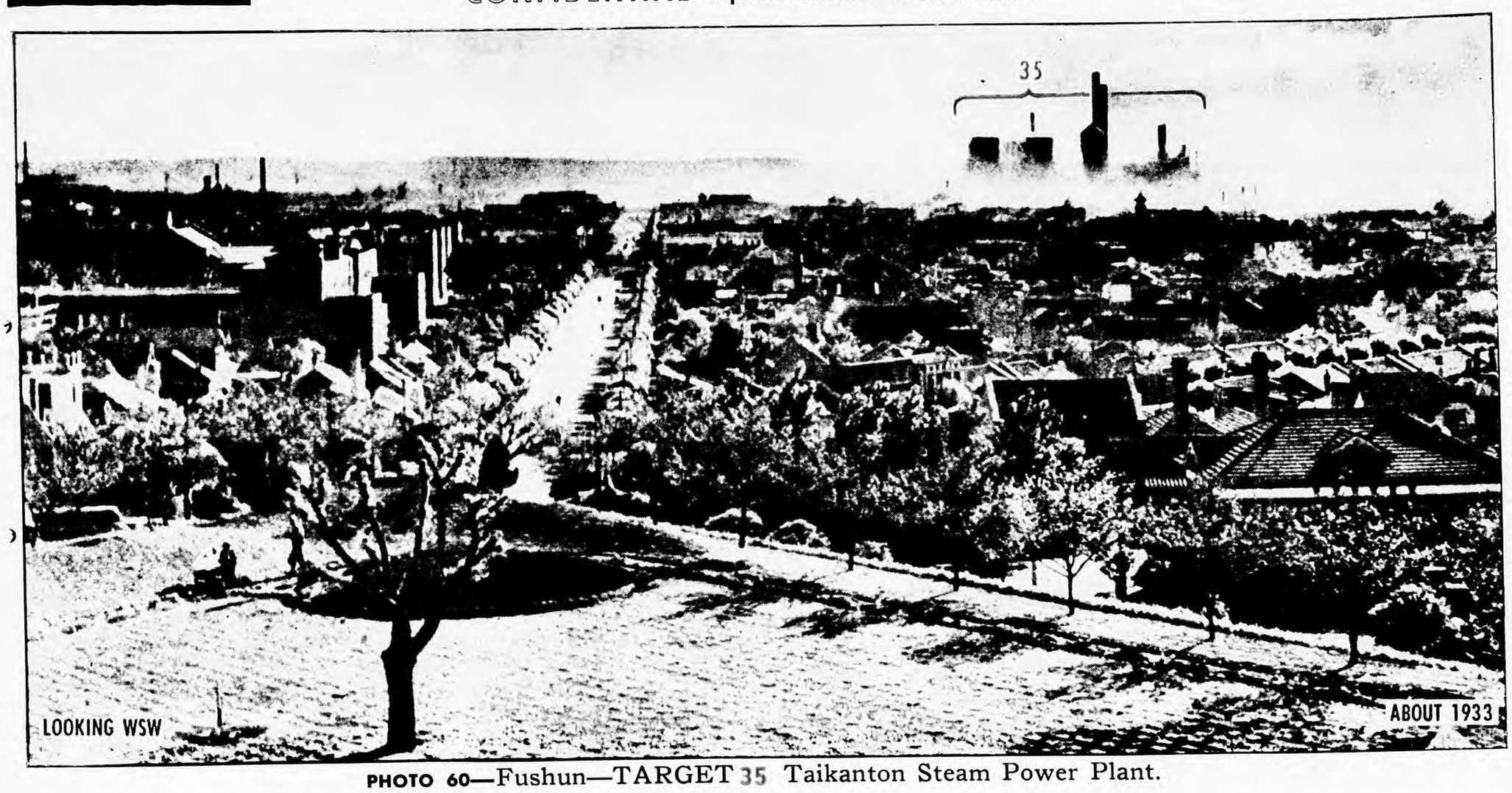
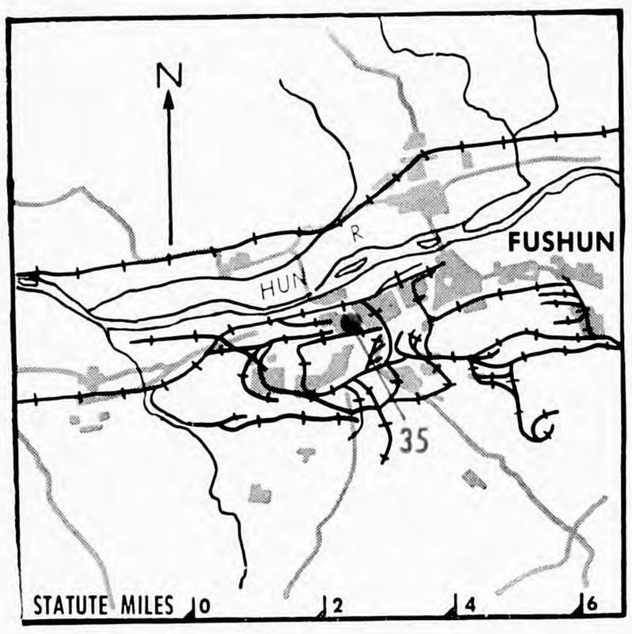


PHOTO 60—Fushun—TARGET 35 Taikanton Steam Power Plant.



TARGET 93.3— 35

TAIKANTON STEAM POWER PLANTS

FUSHUN

(ELECTRIC POWER)

41° 51′ N 123° 52′ E (Approx)—Largest concentration of generating cap in Manchuria network. Only source for direct current required in operation of open-pit mines and electric railway around Fushun. Also supplies alternating current to network for consumption at Mukden, Anshan, etc. Cap 330,000 KW in three adjacent units. No. 1 unit with two small metal stacks has 25,000 KW cap; No. 2 unit with two tall concrete stacks, 55,000 KW; No. 3 unit with five large metal stacks 250,000 KW. Switchgear for No. 3 unit adjoins bldg on W. Transformer stations located across railway to N and directly W. Auxiliary and step-up power lines lead NE, SE, SW and W. TARGET 35 occupies area approx 1000 ft sq along railway directly E of SMR Shale Oil Plant (TARGET 40) and NE of SMR shops (TARGET 63). In addition to the three concrete power houses, with related coal conveyors and railway sidings, compound includes large concrete water tower, six cooling towers and spray pond.

(See photos 60, 61, 62 and 63; map on page M-10.)

PHOTO 61—Fushun—TARGET 40 SMR Shale Oil Plant. TARGET 35 Taikanton Steam Power Plant.

MANCHURIA AREAS NOS. 93.1, 2, 3, 4, 5 TARGET 35 (FUSHUN REGION)

3654—50—Manchuria—12-11-44—First Proof

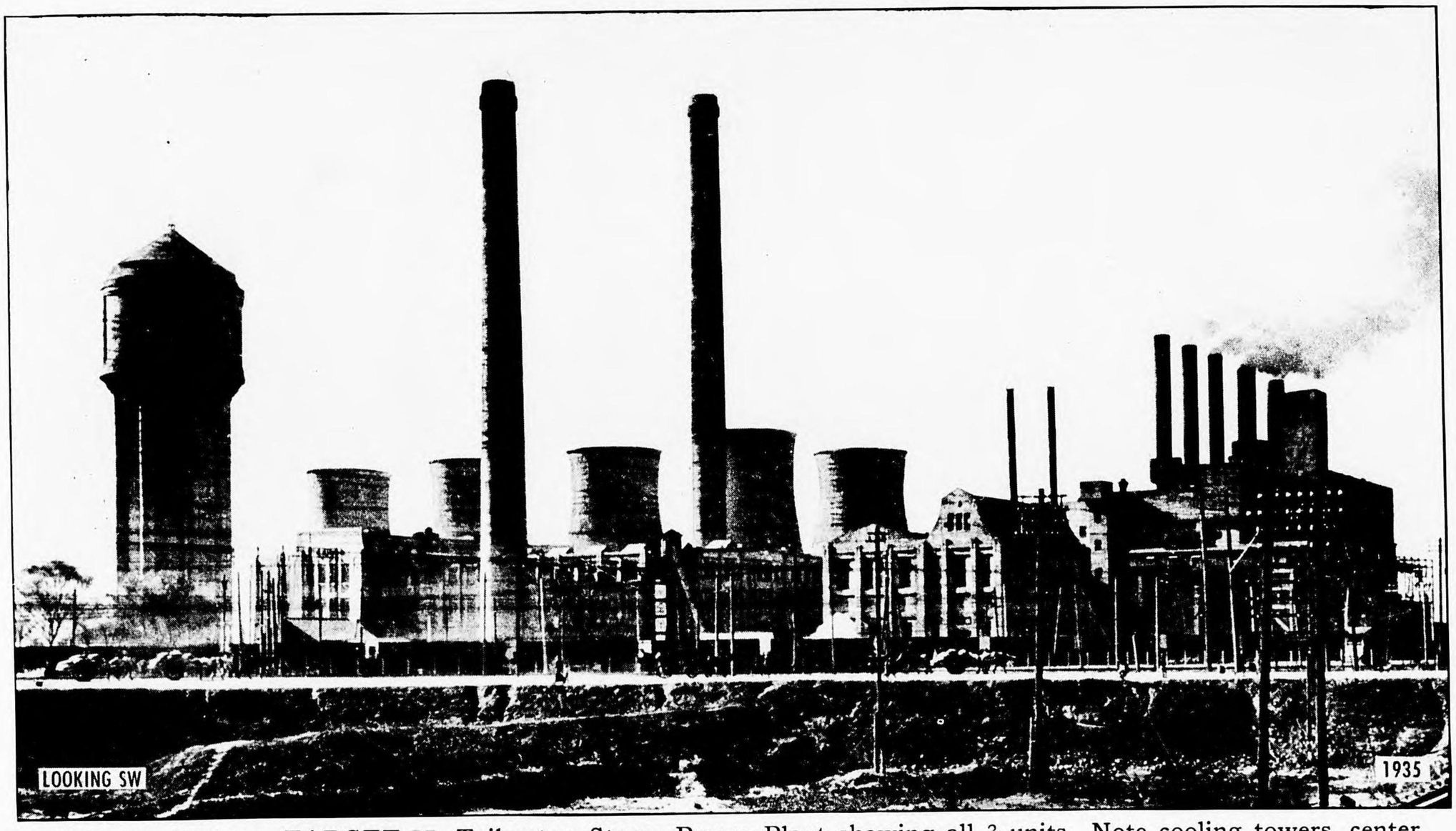


PHOTO 62—Fushun—TARGET 35 Taikanton Steam Power Plant showing all 3 units. Note cooling towers, center.

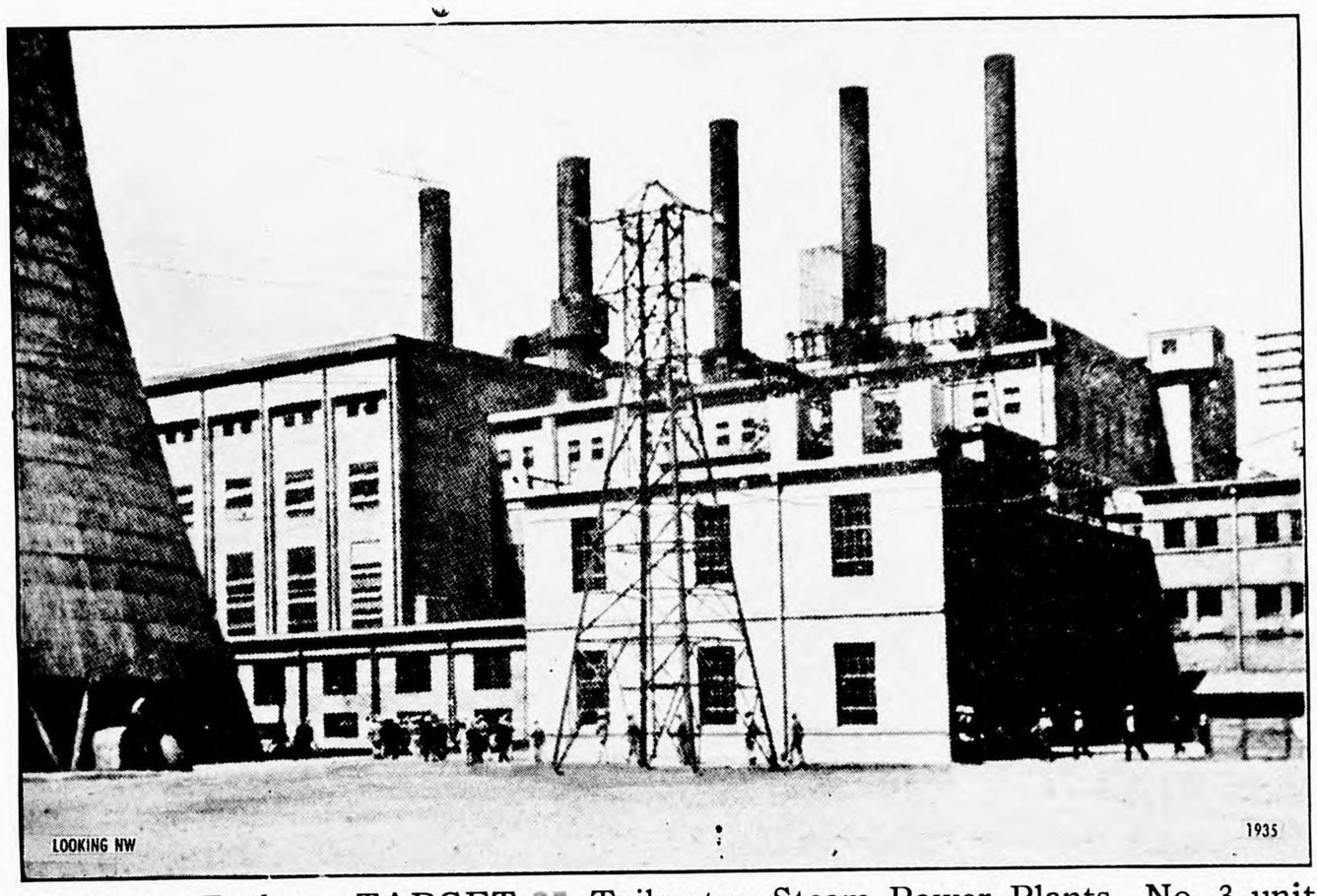
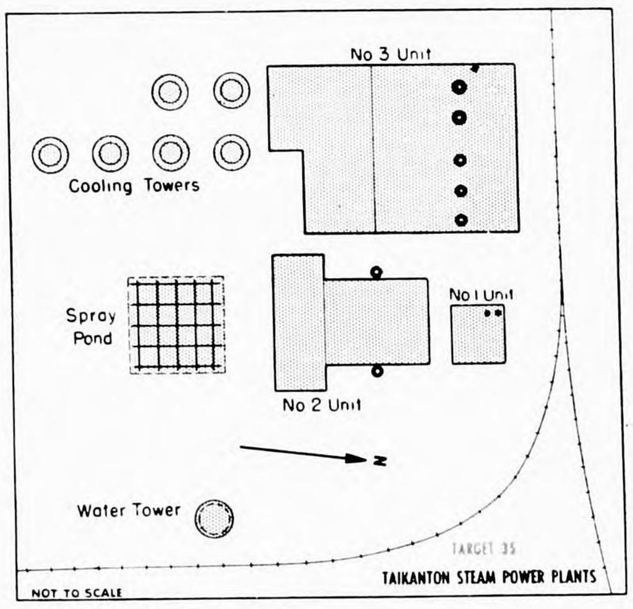


PHOTO 63—Fushun—TARGET 35 Taikanton Steam Power Plants. No. 3 unit of 250,000 KW cap. No. 1 and No. 2 units directly off photo on right. Cooling towers on left.



TARGET 93.3—
63

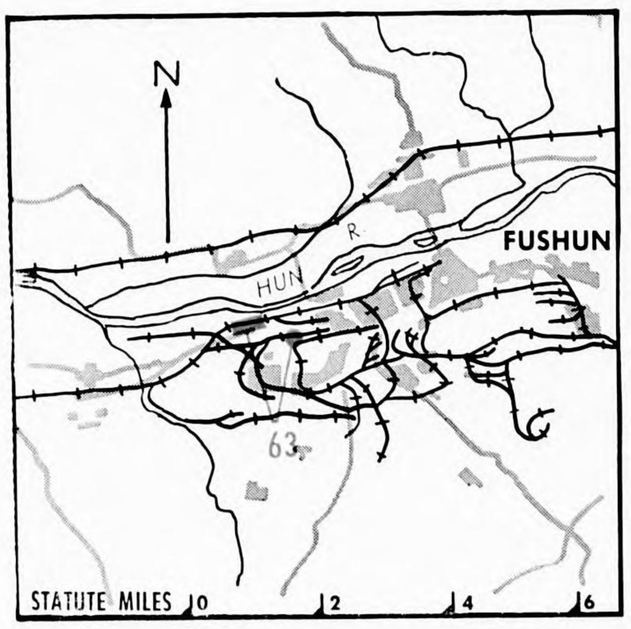
FUSHUN RR YARDS & REPAIR SHOPS

FUSHUN

(TRANSPORTATION)

41° 51′ N 123° 51′ E (Approx)—Extensive yards and sidings serving Fushun coal industry. Small repair shop of local importance SW of Taikanton Power Plant (TARGET 35).

(See map on page M-10.)



3654—51—Manchuria—12-11-44—First Proof

By ELS-DJ NARA, Date 4-7-11

CONFIDENTIAL equals British Confidential

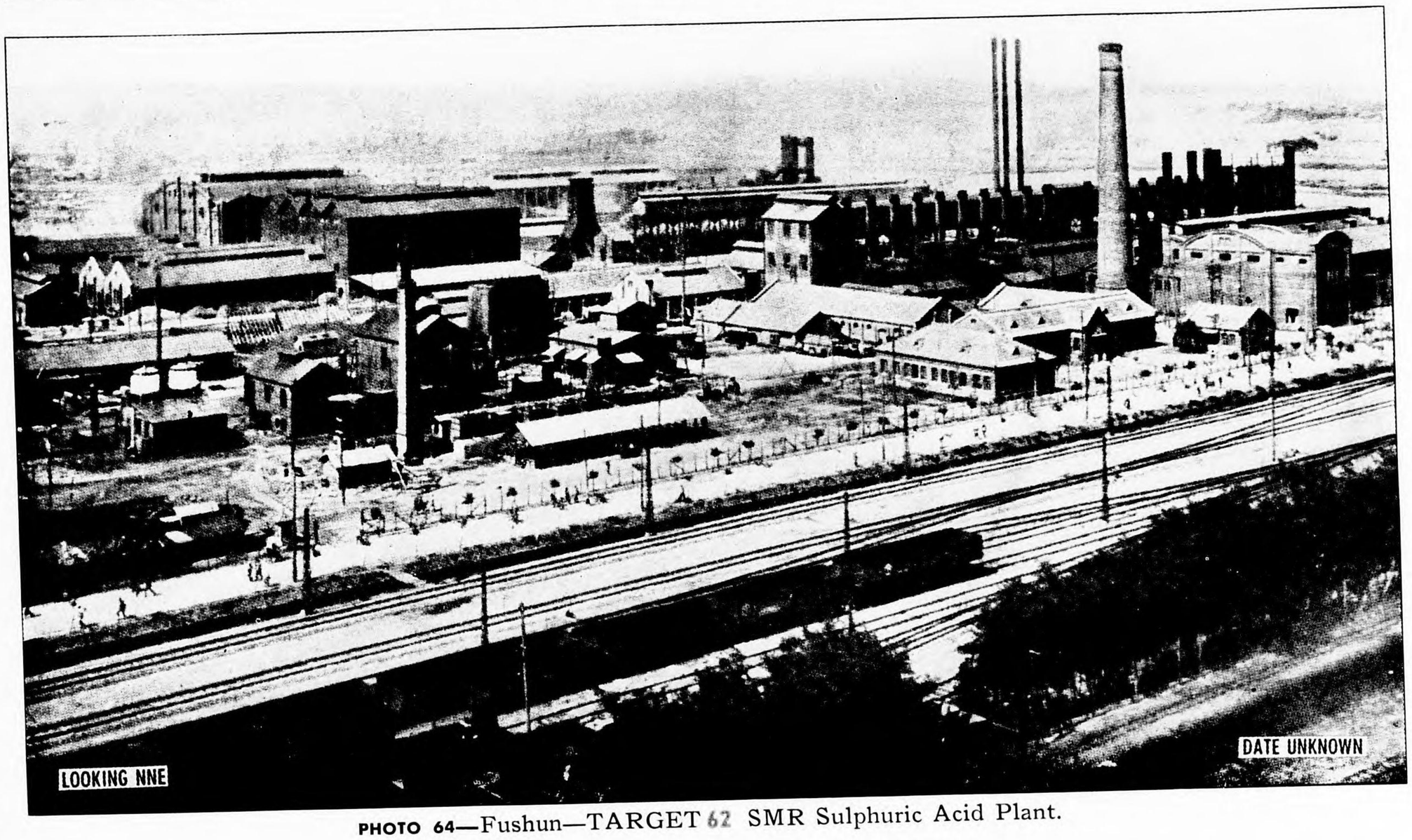
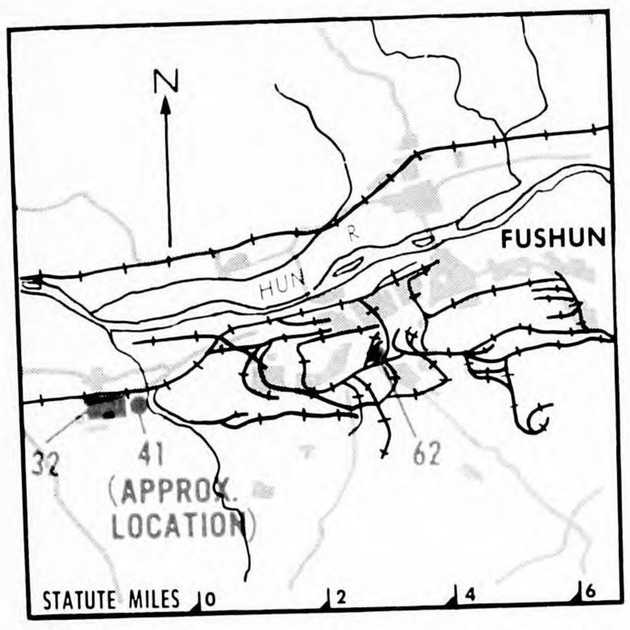


PHOTO 64—Fushun—TARGET 62 SMR Sulphuric Acid Plant.



TARGET 93.3— 41

SMR COAL LIQUEFACTION PLANT

FUSHUN

(PETROLEUM)

41° 50′ N 123° 48′ E (Approx)—In 1939 was estimated producing 60,000 bbls of oil products. Expansion reported. Bldgs of red brick and concrete covering several acres in new industrial area. Includes hydrogen mfg, compression, coal mixing, reaction, gas separation, and distilling plants. Approx four mi SW from SMR shale oil plant (TARGET 40).

(See map on page M-10.)

TARGET 93.3— 32

MANCHURIA LIGHT METALS CO FUSHUN PLANT

(Manshu Keikingoku Seijo KK)

FUSHUN

(NON-FERROUS METALS)

41° 50′ N 123° 47′ E (Approx)—Includes large alumina and aluminum plant. Only plant in Manchuria with complete facilities for transforming clay to finished aluminum. Compound also includes large magnesium plant of this company. Estimated 1943 capacities approx: alumina 48,000 metric tons, aluminum 18,000 metric tons, magnesium 2000 metric tons. Walled compound covers about 30 acres.

(See map on page M-10.)

TARGET 93.3— 62

SMR SULPHURIC ACID PLANT

FUSHUN

(CHEMICALS)

41° 50′ N 123° 51′ E (Approx)—Compound includes sulphuric acid plant, Mond gas plant, and minor chemical installations. Acid plant reported divided into two bldgs, one producing 50 tons chamber acid per day by Brinkey system, second producing 50 tons by Meyer system. Acid used at SMR shale oil plant and Mond gas plant. Mond gas plant supplies gas to number of isolated boiler plants for heating. Also has small auxiliary power plant, cap 12,000 KW.

(See photo 64; map on page M-10.)

3654—52—Manchuria—12-11-44—First Proof

CONFIDENTIAL equals British Confidential

CONFIDENTIAL equals British Confidential

PHOTO 65—Fushun—Fushun Colliery.

MANCHURIA AREAS NOS. 93.1, 2, 3, 4, 5 GENERAL PHOTOS (FUSHUN REGION)

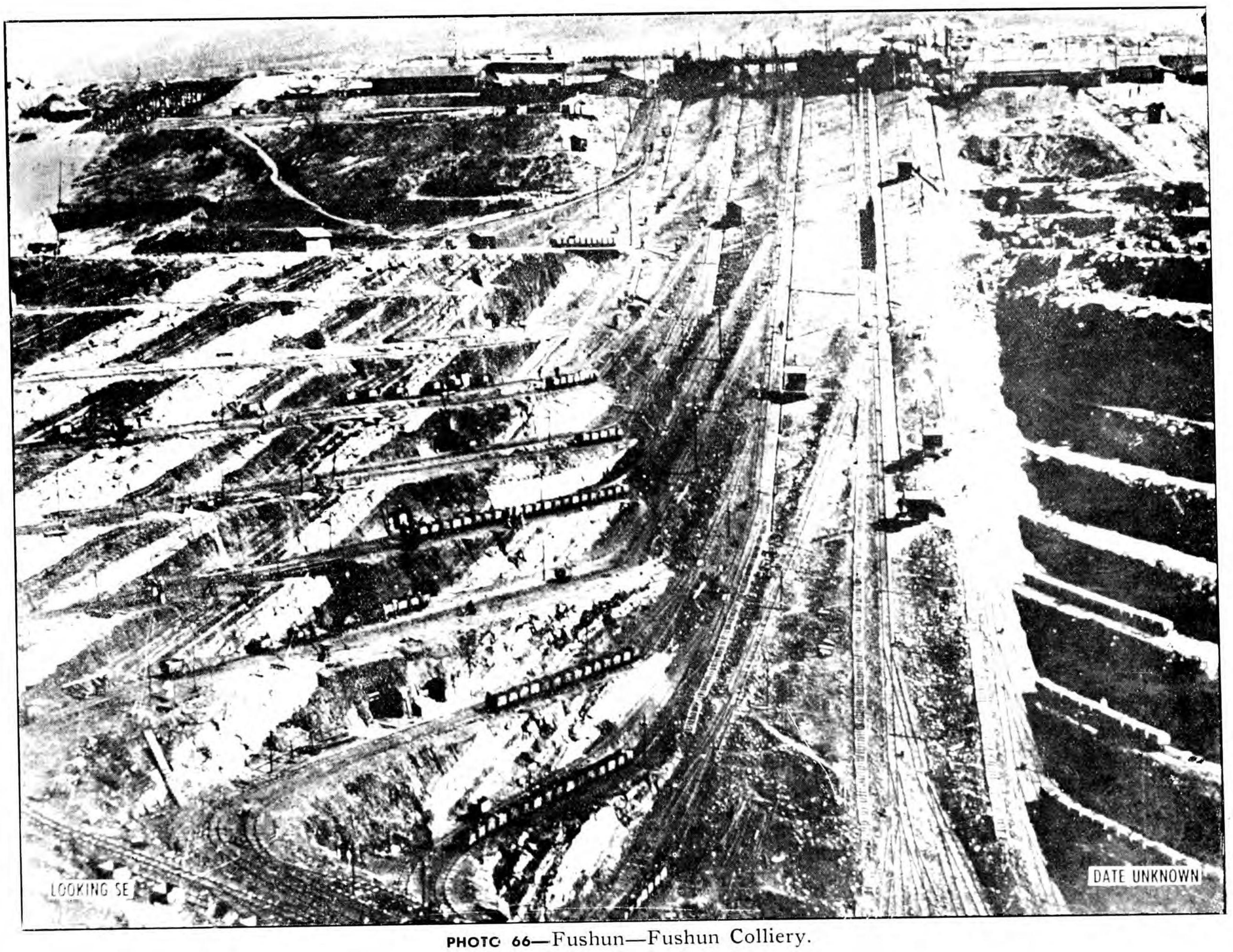


PHOTO 66—Fushun—Fushun Colliery.

3654 •53—Manchuria 12-11-44—First Proof

CONFIDENTIAL equals British Confidential

MANCHURIA AREAS NOS. 93.1, 2, 3, 4, 5 GENERAL PHOTOS (FUSHUN REGION)

CONFIDENTIAL equals British Confidential

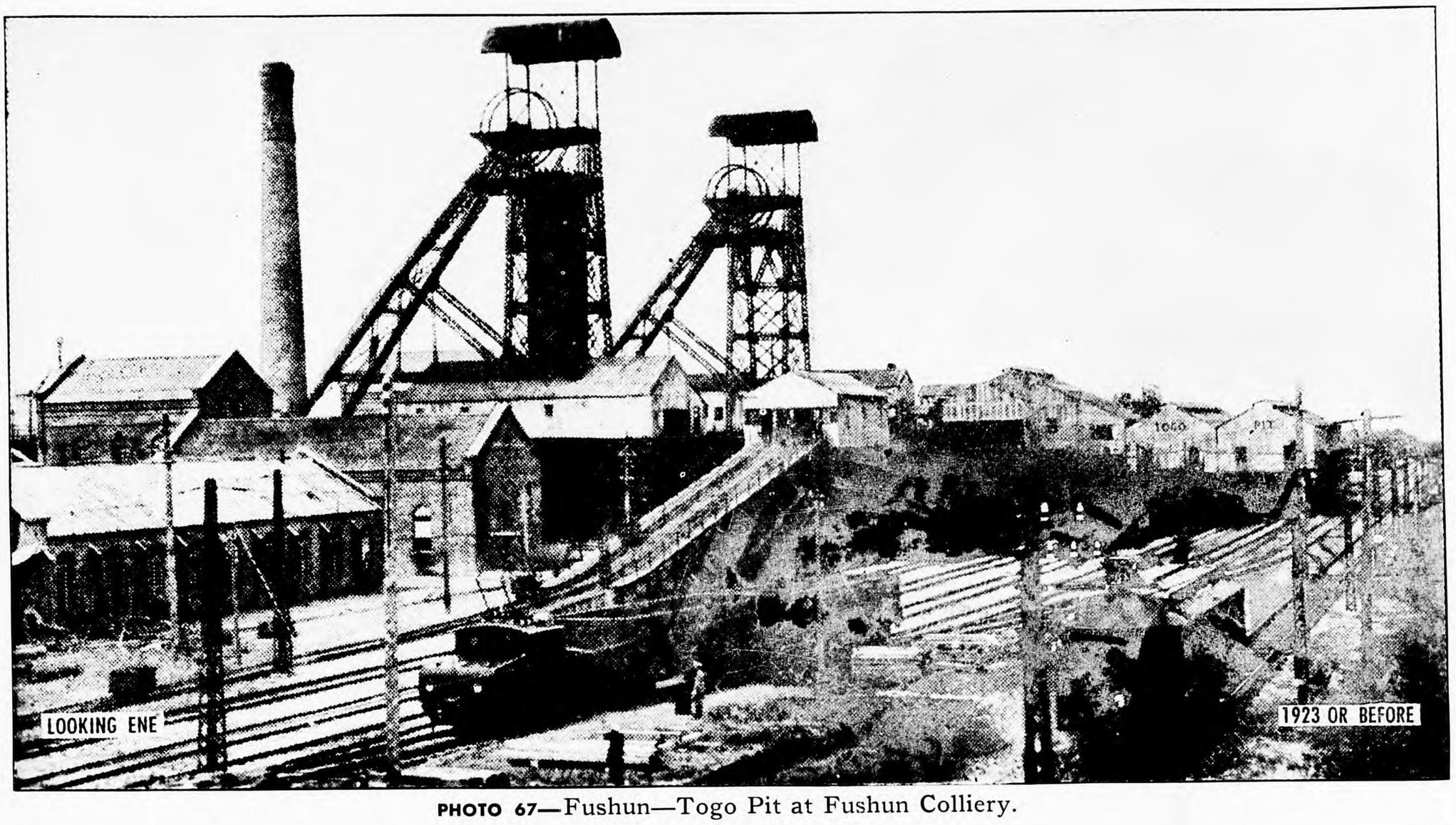


PHOTO 67—Fushun—Togo Pit at Fushun Colliery.

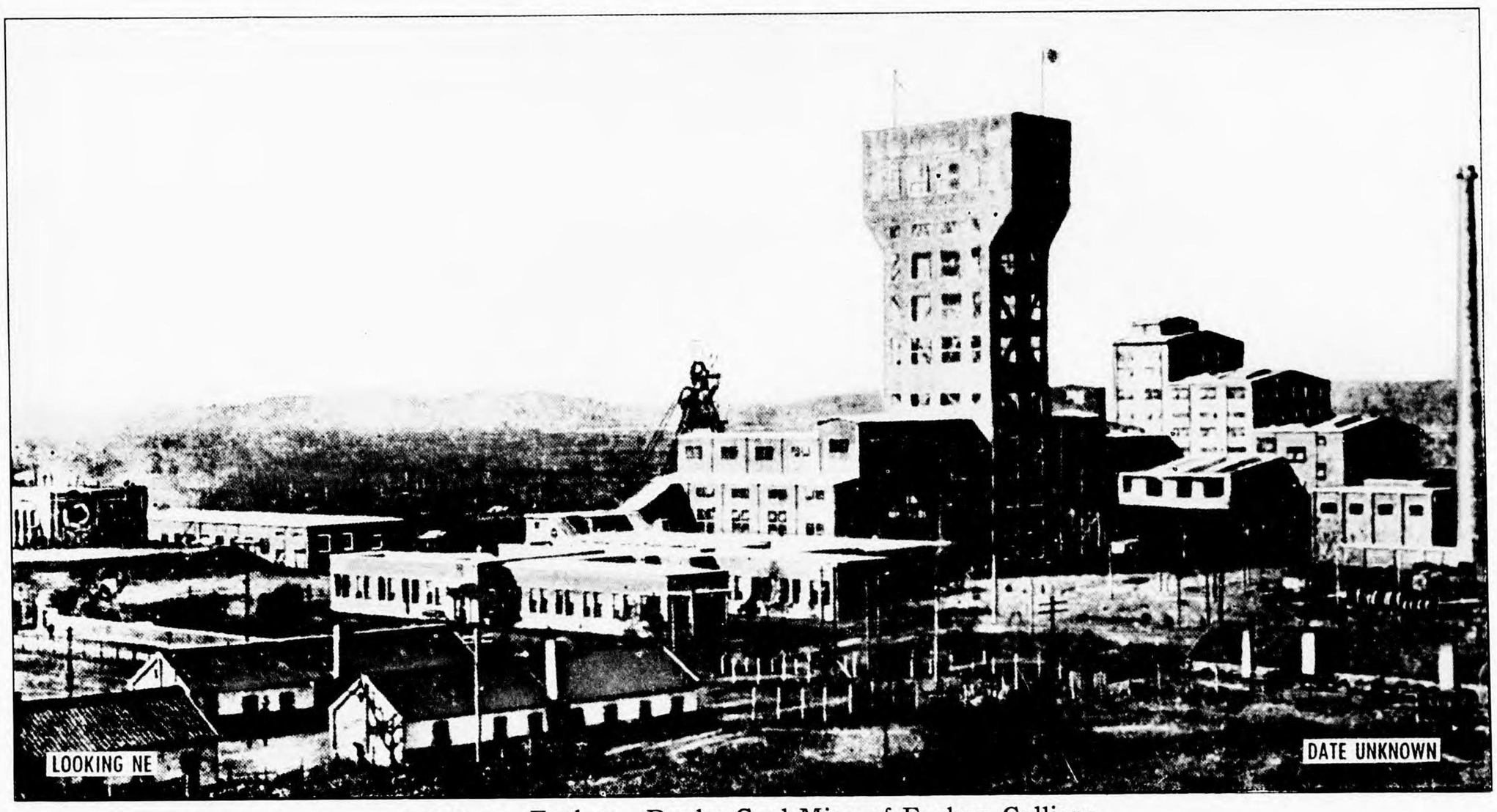


PHOTO 68—Fushun—Ryuho Coal Mine of Fushun Colliery.

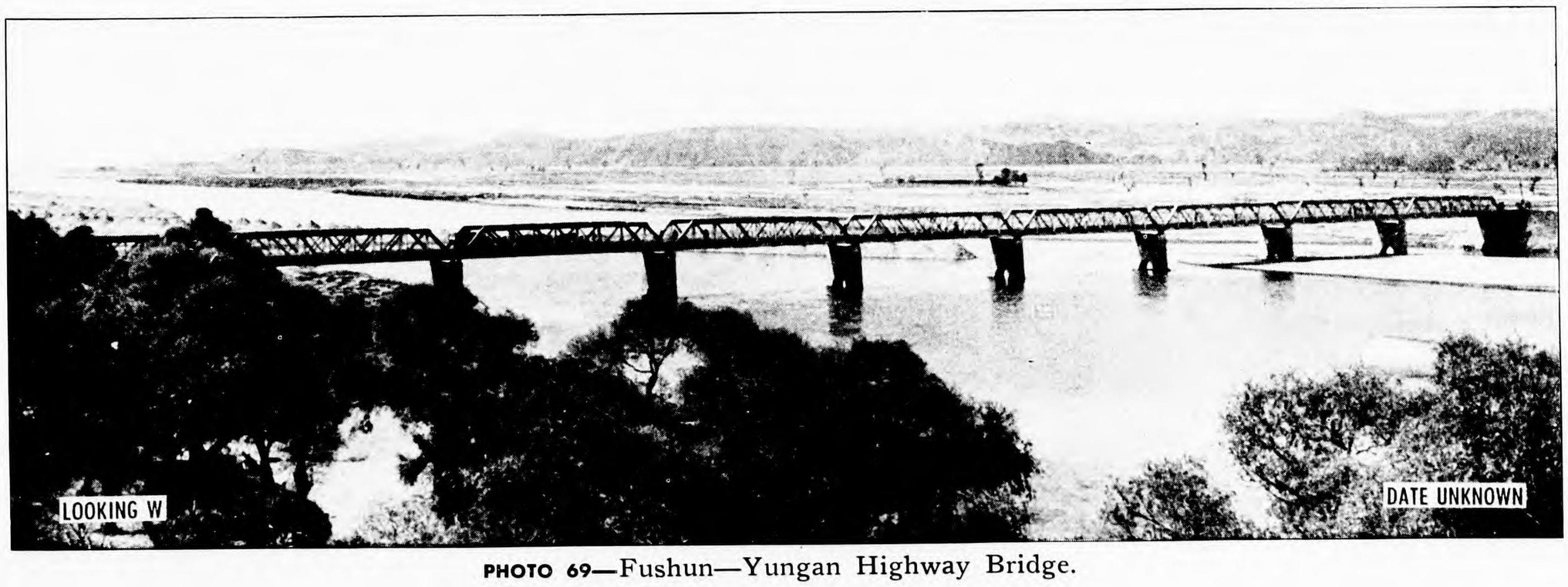


PHOTO 69—Fushun—Yungan Highway Bridge.

CONFIDENTIAL equals British Confidential

3654—54—Manchuria—12-11-44—First Proof

CONFIDENTIAL equals British Confidential

Air Objective Folder

NORTHERN MANCHURIA REGIONS:

HARBIN, TSITSIHAR, CHIAMUSSU, HAILAR, MANCHURIA AREAS, Nos. 93.1, 2, 3, 4, 5

INDEX OF TARGETS BY NUMBER, CLASSIFICATION AND NAME

TARGET NUMBER	NAME	PAGE
	TRANSPORTATION	
91	Harbin RR Yards & Warehouses	56
92	Harbin RR Bridge No. 1	56
113	Harbin RR Bridge No. 2	56
114	Harbin RR Repair Shops	56
155	Tsitsihar RR Repair Shops & Yards	58

Summary and Evaluation of Northern Manchuria Regions, Harbin, Tsitsihar, Chiamussu, Hailar

The city of Harbin is the hub of the rail system in North Manchuria with lines to Mukden, Manchouli, Heiho, Chiamussu, Suifenho, and Rashin. Harbin is the focal point for the distribution of military supplies, and located in a predominately agricultural area, is the milling and trans-shipment point for large tonnages of soy beans, wheat, and livestock. As a center of ordnance and troop dispersal, Harbin also has extensive barracks and depot areas.

Listed as targets at Harbin are the largest yards and warehouses **TARGET 91** and repair shops **TARGET 114** in northern Manchuria, and two important railroad bridges—**TARGET 92** carrying the single-track line west to the military bases of Tsitsihar and Manchouli, and **TARGET 113** carrying the single-track line north to the bases of Peian and Heiho.

The soybean products and flour output is greater than that of any other single region in Manchuria. The five largest mills, as well as other mill areas, have been indicated on map on page M-10. Other installations not listed as targets and located on map M-10 are two large fuel alcohol distilleries (each capable of producing over 4000 gallons daily), two cement plants, and the two thermal electric power plants serving Harbin.

Harbin is the most important river port in Manchuria. It is the main center of the waterway net of North Manchuria and serves as an outlet for the large agricultural region comprising the northeastern half of the country. Cargo handled in 1938 totalled 645,800 tons. Items in order of importance were coal, soy beans, lumber, wheat flour, and firewood. Passengers using the port in 1929 totalled 913,000. The port extends for four miles along the Sungari River. Throughout this length there are a total of 56 wharfs with frontages varying from 190 to 650 ft. All are served by railroad sidings and have numerous freight sheds and open storage areas. The river is frozen from the end of November until the end of March. During this period large numbers of river steamers and junks anchor in the areas shown on map on page M-10.

The cities of Tsitsihar, Chiamussu and Hailar, located in agricultural regions, are primarily important as military bases for the extensive chain of fortifications maintained by the Kwantung Army along the borders of northern Manchuria.

Tsitsihar is covered with barracks, warehouses and depot areas, and includes one small arsenal. New railroad repair shops **TARGET 155** have been constructed to service all of the lines in northwest Manchuria. They are capable of heavy military equipment repair. (See map on page M-10.) The city depends on one electric steam power plant.

Chiamussu is a large military base with extensive railroad yards and warehouses. There is one 50,000 KW power plant. (See map on page M-11.) Located on the lower Sungari River, it is also one of the large Manchurian river ports. About 128,000 tons of cargo, chiefly agricultural products, were handled in 1938.

The base at Hailar depends on the railroad shops for military tank repair (See map on page M-11).

MANCHURIA AREAS NOS. 93.1, 2, 3, 4, 5 INDEX AND SUMMARY (NORTHERN MANCHURIA REGIONS)

3654 3630—55—Manchuria—7-11-44—First Proof

CONFIDENTIAL equals British Confidential

By HR-m NARA, Date 1/31/97

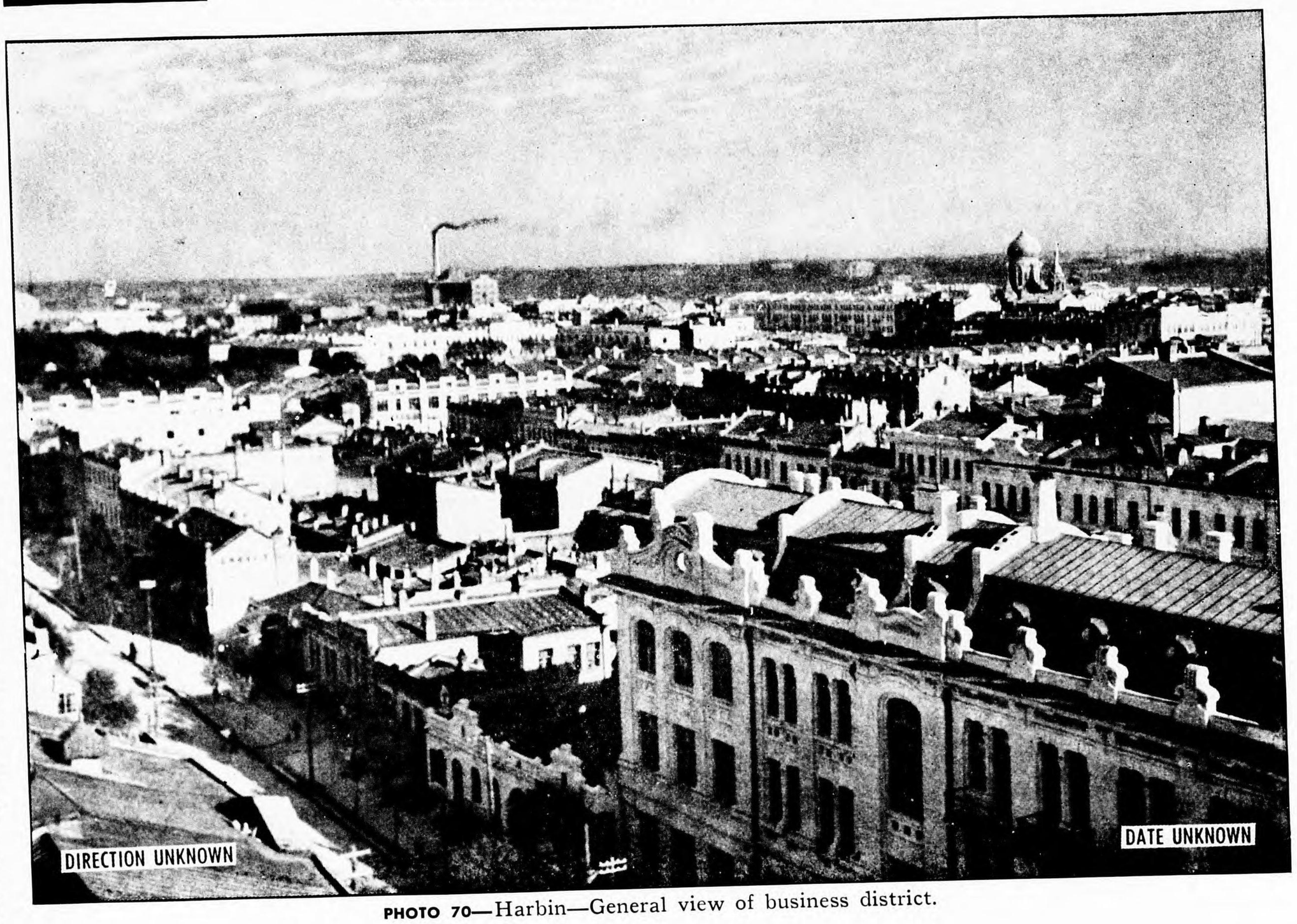
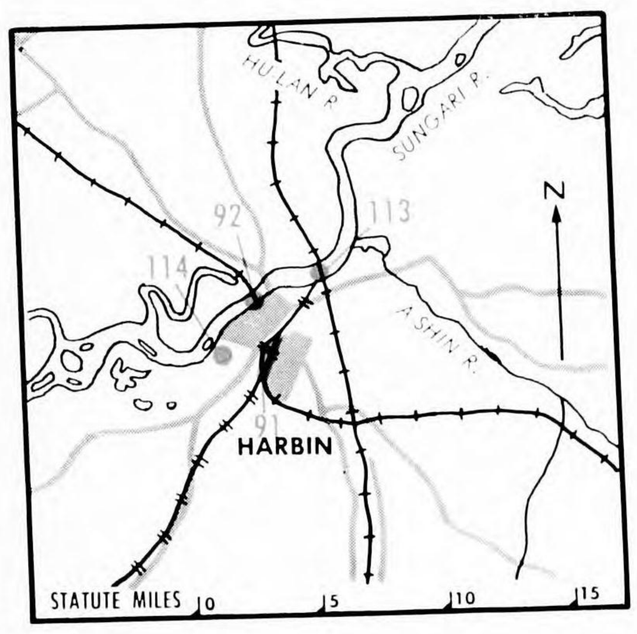


PHOTO 70—Harbin—General view of business district.



TARGET 93.1—113

HARBIN RR BRIDGE No. 2

HARBIN

(TRANSPORTATION)

45° 48′ N 126° 40′ E (Approx)—Bridge over Sungari River carrying single-track line N to Peian and Heiho. Important military traffic route.

(See map on page M-10.)

TARGET 93.1—114

HARBIN RR REPAIR SHOPS

HARBIN

(TRANSPORTATION)

45° 47′ N 126° 37′ E (Approx)—Largest repair shops in N Manchuria, serving entire Harbin Division of State Railways. Also build rolling stock. Yards adjacent. NW of main yards and station.

(See map on page M-10.)

TARGET 93.1—91

HARBIN RR YARDS & WHSES

HARBIN

(TRANSPORTATION)

45° 45′ N 126° 36′ E (Approx)—Largest Yards in N Manchuria serving hub of N Manchuria rail system with lines to Mukden, Manchouli, Heiho, Chiamussu, Suifenho, and Rashin. Military traffic northbound, large movement of soybeans and flour from Harbin mills S. Handle about 900 cars daily. Two locomotive sheds. Whses for storage. Adjacent to main station.

(See map on page M-10.)

TARGET 93.1—92

HARBIN RR BRIDGE No. 1

HARBIN

(TRANSPORTATION)

45° 48′ N 126° 37′ E (Approx)—Old bridge of Chinese Eastern Railway carrying single-track line W to Tsitsihar and Manchouli. 19 iron girder spans, total length over 3000 ft. Reported paralleled by new bridge.

(See photos 71 and 72; map on page M-10.)

3654—56—Manchuria—12-11-44—First Proof

MANCHURIA AREAS NOS. 93.1, 2, 3, 4, 5 TARGETS 113, 114, 91, 92 (NORTHERN MANCHURIA)

CONFIDENTIAL equals British Confidential

CONFIDENTIAL equals British Confidential

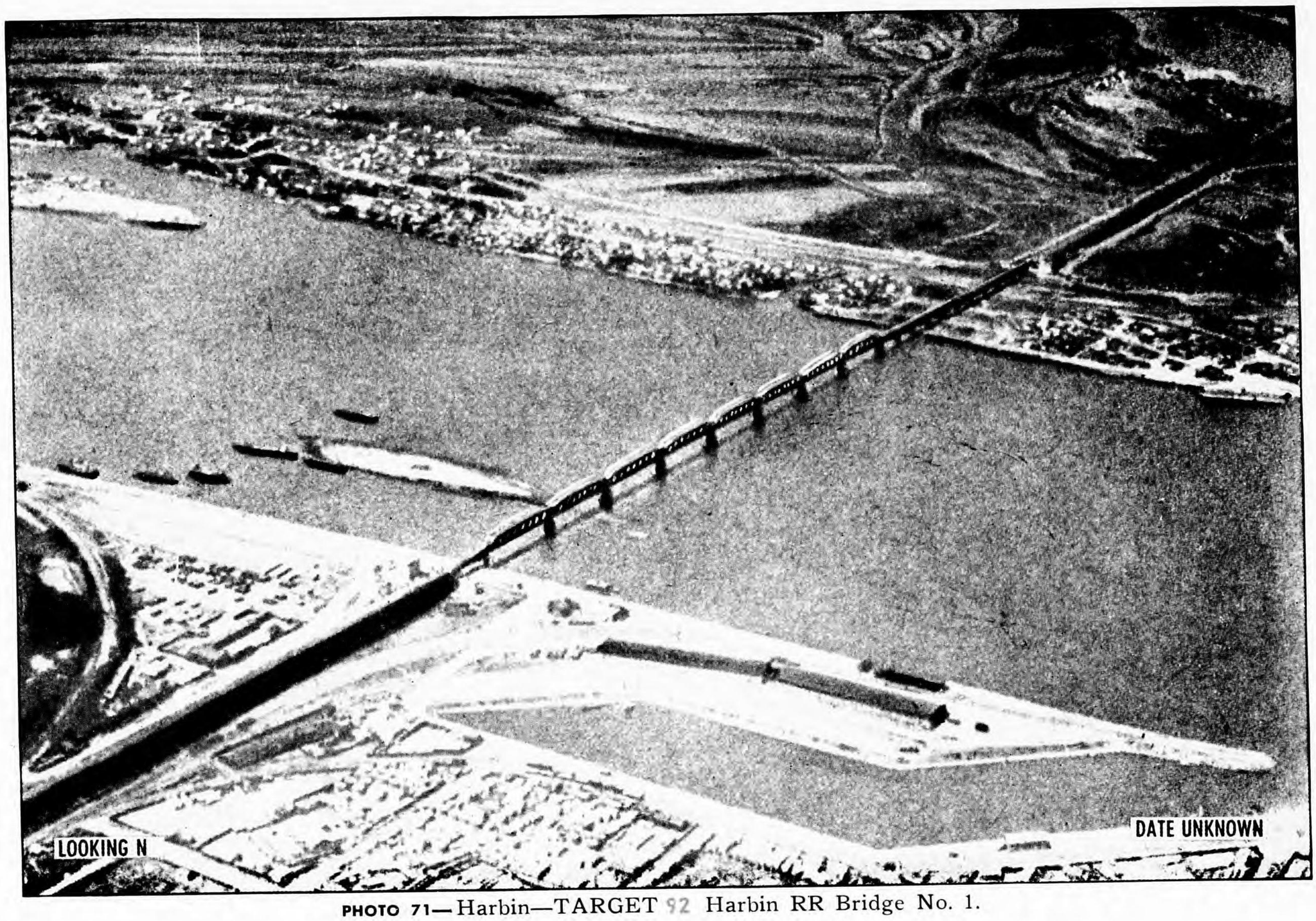


PHOTO 71—Harbin—TARGET 92 Harbin RR Bridge No. 1.

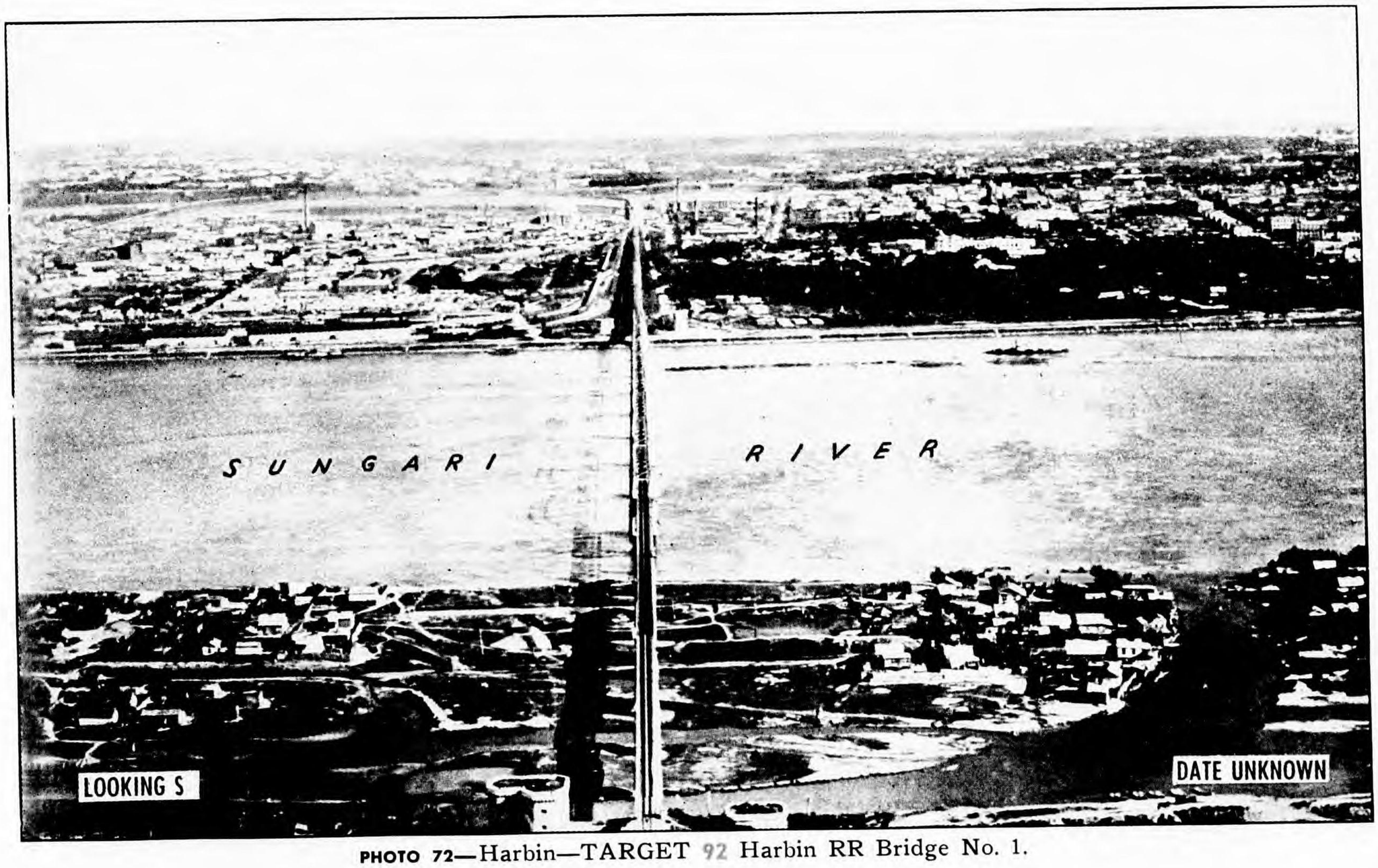
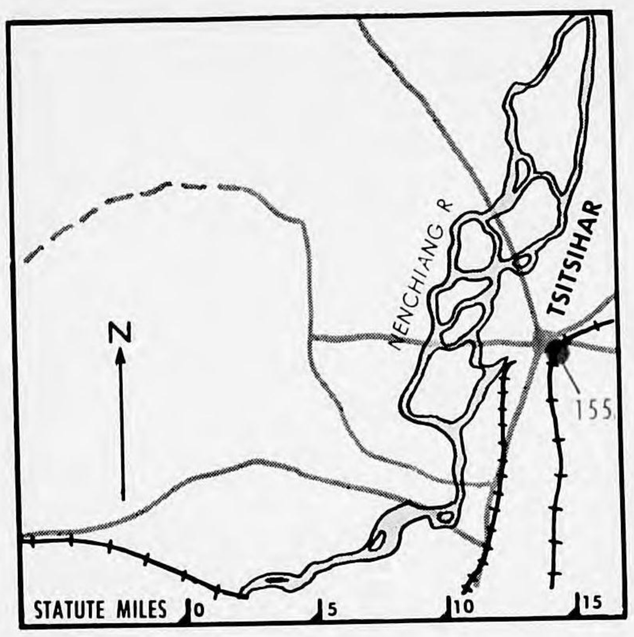


PHOTO 72—Harbin—TARGET 92 Harbin RR Bridge No. 1.

MANCHURIA AREAS NOS. 93.1, 2, 3, 4, 5 GENERAL PHOTOS (NORTHERN MANCHURIA REGIONS)

3654—57—Manchuria—12-11-44—First Proof

CONFIDENTIAL equals British Confidential



TARGET

93.1—

155

TSITSIHAR RR REPAIR SHOPS & YARDS

TSITSIHAR

(TRANSPORTATION)

47° 20′ N 123° 59′ E (Approx)—New repair shops in N Manchuria, servicing NW Manchurian railway operations. Probably equipped to repair and construct tanks and artillery. Freight yards.

(See photos 74 and 75; map on page M-10.)

PHOTO 73—Tsitsihar.

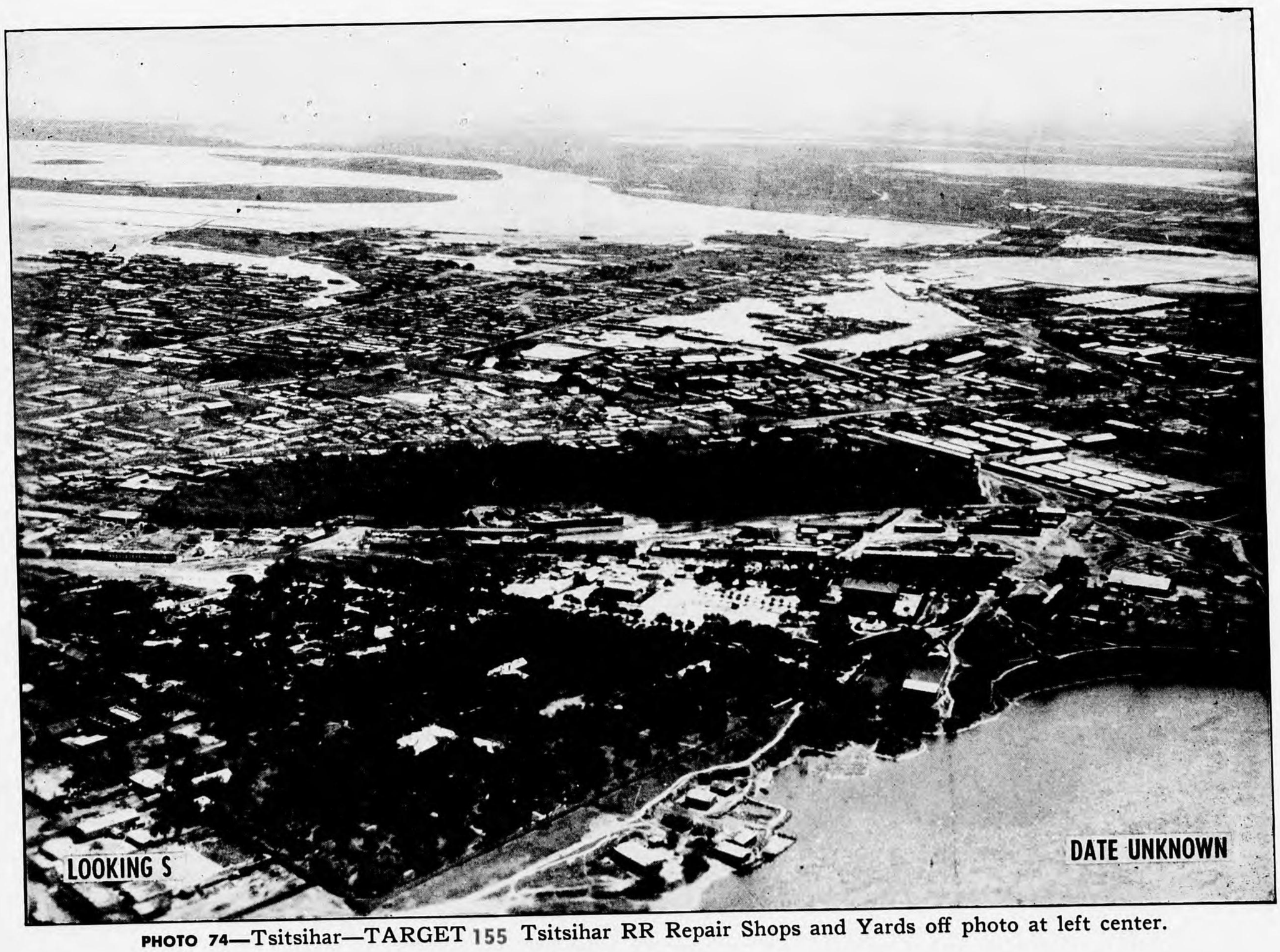


PHOTO 74—Tsitsihar—TARGET 155 Tsitsihar RR Repair Shops and Yards off photo at left center.

CONFIDENTIAL equals British Confidential

3654—58—Manchuria—12-11-44—First Proof

By [illegible] NARA, Date [illegible]

CONFIDENTIAL equals British Confidential

PHOTO 75—Tsitsihar—TARGET 155 Tsitsihar RR Repair Shops and Yards off photo at right center.

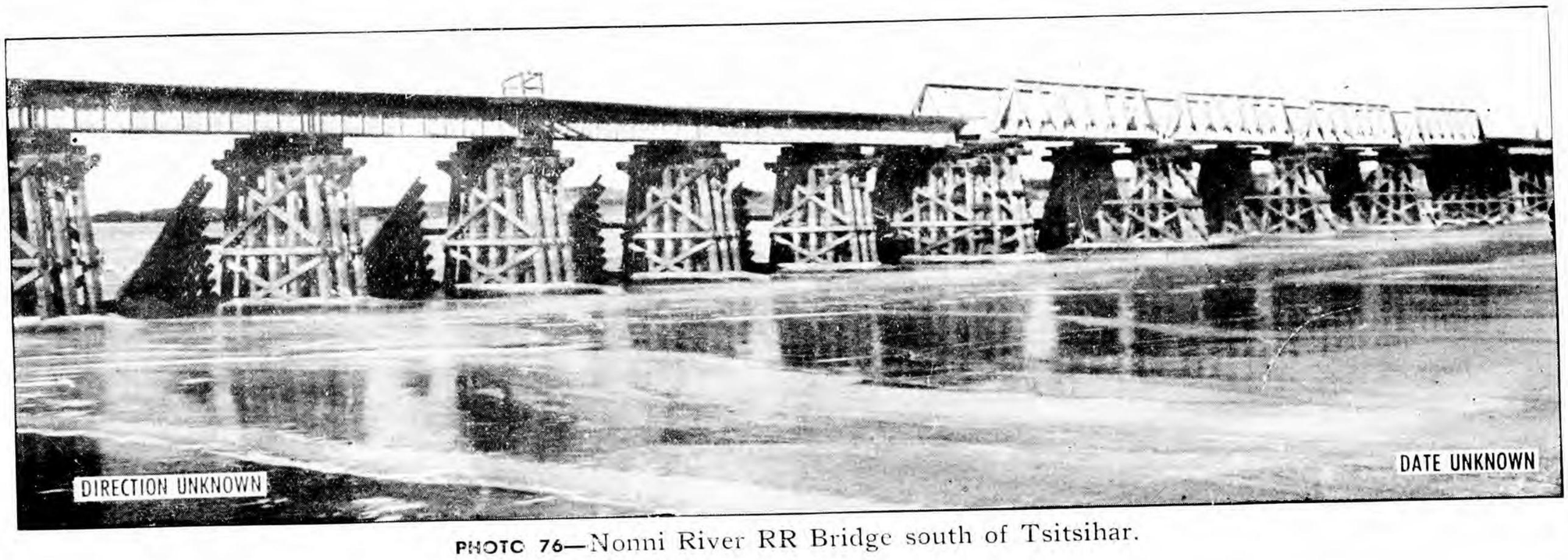


PHOTO 76—Nonni River RR Bridge south of Tsitsihar.

PHOTO 77—Hailar.

MANCHURIA AREAS NOS. 93.1, 2, 3, 4, 5 GENERAL PHOTOS (NORTHERN MANCHURIA REGIONS)

CONFIDENTIAL equals British Confidential

3654—59—Manchuria—12-11-44—First Proof

Air Objective Folder
OUTLYING TARGETS
MANCHURIA AREAS, Nos. 93.1, 2, 3, 4, 5

INDEX OF TARGETS BY NUMBER, CLASSIFICATION AND NAME

TARGET NUMBER	NAME	PAGE
	ELECTRIC POWER	
39	Fuhsin Steam Power Plant	64
55	Kirin Hydro-electric Plant	70
56	Suiho Hydro-electric Plant	65
	HARBOR FACILITIES	
85	Tashito Harbor Facilities	67
172	Hulutao Port Facilities	62
174	Yingkou (Newchwang) Harbor Facilities	61
188	Tatung Harbor Facilities	67
	IRON AND STEEL	
57	Tunghua Steel Works	67
	NON-FERROUS METALS	
34	Manchuria Magnesium Industry Co.	61
187	Hulutao (Koroto) Lead & Zinc Smelter	62
	PETROLEUM	
43	Manchuria Coal Liquefaction Co.	69
58	Kirin Artificial Oil Co.	69
175	Manchuria Synthetic Fuel Co.	64
	TRANSPORTATION	
72	Antung RR Yards	66
77	Yalu River RR Bridges	66
362	Ssupingkai RR Yards & Repair Shops	69
363	Hsinking RR Yards	71
364	Kirin RR Yards & Repair Shop	68
365	Suifenho RR Repair Shops & Yards	65
366	Mutanchiang RR Yards	65
368	Taishi River RR Bridges	71

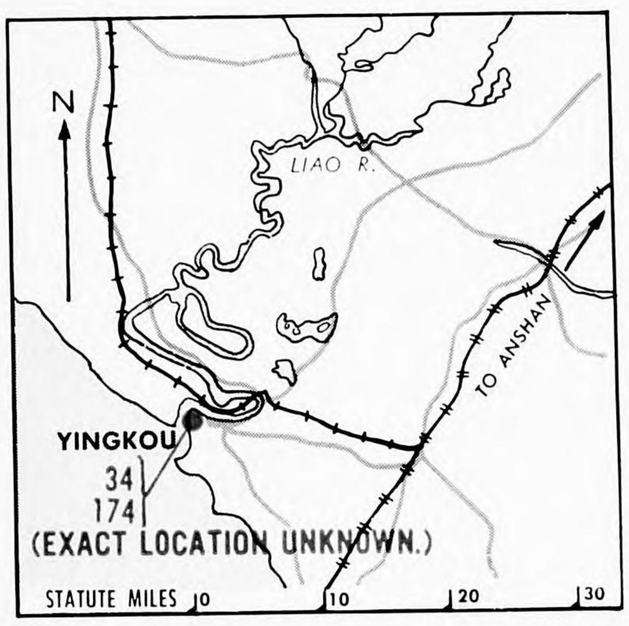
MANCHURIA AREAS NOS. 93.1, 2, 3, 4, 5 INDEX (OUTLYING TARGETS)

J157 36630—60—Manchuria—7-111-444—First Proof

MANCHURIA AREAS NOS. 93.1, 2, 3, 4, 5 INDEX (OUTLYING TARGETS)

CONFIDENTIAL equals British Confidential

PHOTO 78—Yingkou—TARGET 174 Yingkou Harbor.



TARGET 93.3— 174

YINGKOU (NEWCHWANG) HARBOR FACILITIES

YINGKOU

(HARBOR FACILITIES)

40° 41′ N 122° 12′ E (Approx)—Old river port on the Liao Ho (River) 13 mi above entrance bar. Port requires dredging. Pre-war draft limit except at spring tides 17 ft. Wharf area extensive and vessels lie broadside to river banks. Small RR repair shop for freight cars. Storage facilities for 176,000 gals of gasoline; one tank for 428,718 gals of kerosene. Also bunker and kerosene pipelines with 150-200 tons per hour rate of discharge. RR connections with Mukden-Tientsin and Mukden-Dairen lines. Harbor frozen more than one-third of year (average November 20 to April 10).

(See photo 78; map on page M-12.)

TARGET 93.3— 34

MANCHURIA MAGNESIUM INDUSTRY CO

(Manshu Magnesium Kogyo KK)

YINGKOU

(NON-FERROUS METALS)

40° 40′ N 122° 20′ E (Approx)—Began operations in 1941 with estimated cap of 1000 tons. An addition to the plant was reported in 1943. Magnesia said to be supplied from a number of small kilns in vicinity of Tashihchiao approx 15 mi. E. Exact location at Yingkou unknown.

3654—61—Manchuria—12-11-44—First Proof

PHOTO 79—Hulutao—TARGET 172 Hulutao Port Facilities.

TARGET 93.3— 187

HULUTAO (KOROTO) LEAD & ZINC SMELTER

HULUTAO

(NON-FERROUS METALS)

40° 44′ N 120° 56′ E (Approx)—Began operations in 1941. Estimated 1943 cap: 12,600 metric tons of low grade zinc, approx 15% of Inner Zone cap; 7000 metric tons of lead, approx 10% of Inner Zone cap. Located about 4 mi inland on level open area blasted from top of barren promontory extending beyond Hulutao into Liaotung Bay. Includes one large five-story plant of corrugated iron on steel framework, with reinforced concrete floors. Several other smaller two-story bldgs of similar construction, but with corrugated iron floors. All bldgs have corrugated iron roofs. Liaotung Bay is on the E, hills to the N, NW and S, while on the W is a flat area. RR sidings connect the plant with the branch line to the newly developed port of Hulutao. Critical points are gas producer house, vertical retorts, acid plant and roaster plant.
(See map on page M-13.)

TARGET 93.3— 172

HULUTAO PORT FACILITIES

HULUTAO

(HARBOR FACILITIES)

40° 44′ N 121° 01′ E (Approx)—Developed to export coal from the Fushin coal fields, with which it is connected by a new rail line. Officially opened in 1937 with plans to annually handle 3,500,000 tons of freight by 1941. About 90% of construction work completed by 1941. Installations reported to include concrete wharf, concrete breakwater, pier, dock, lighthouse and freight yard. Dredged part of harbor, 1941, 7,000,000 sq ft.
(See photos 79, 80 and 81; map on page M-13.)

3654—'62—Manchuria—12-11-44—First Proof

CONFIDENTIAL equals British Confidential

PHOTO 80—Hulutao—TARGET 172 Hulutao Port Facilities.

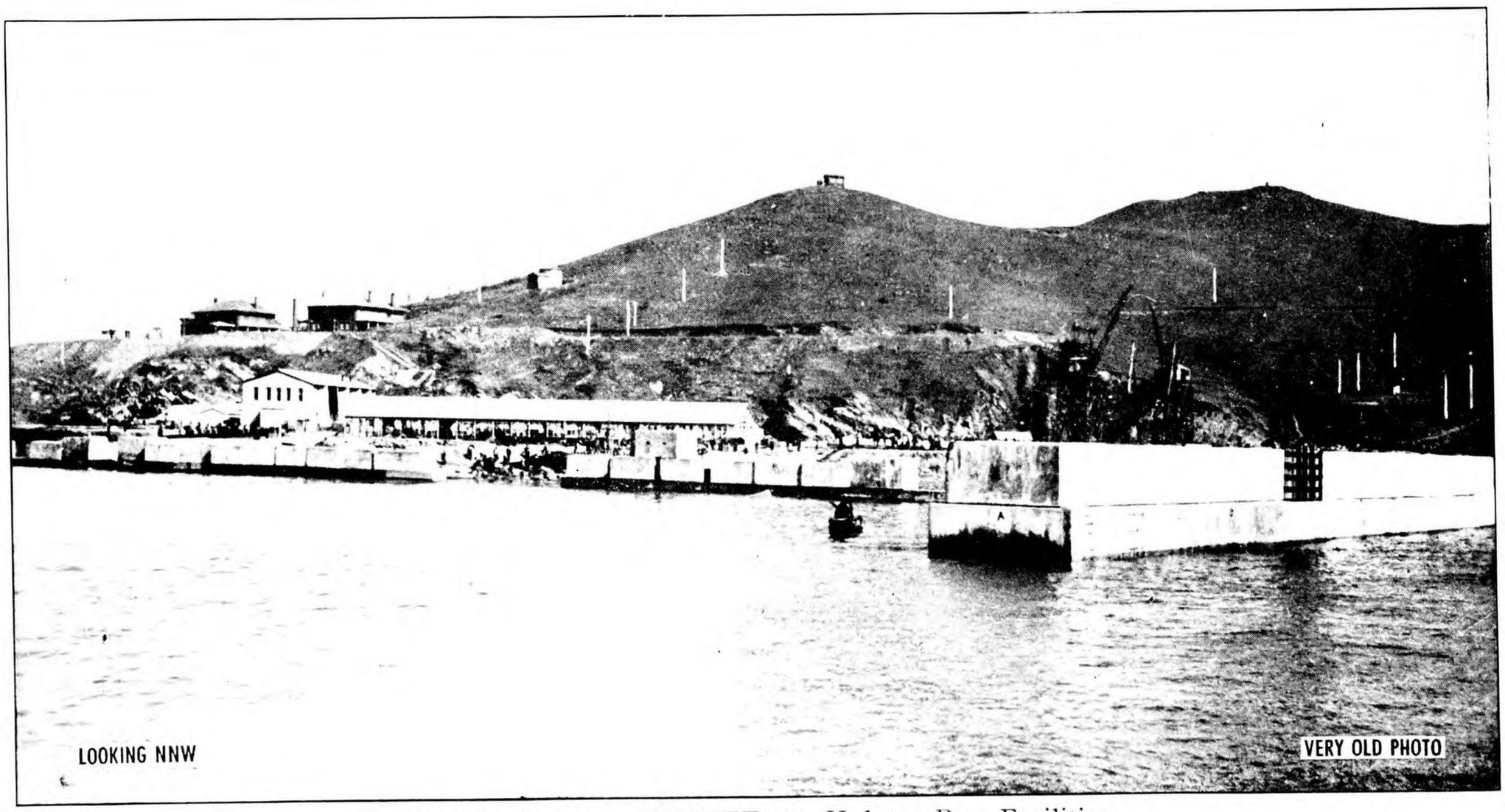


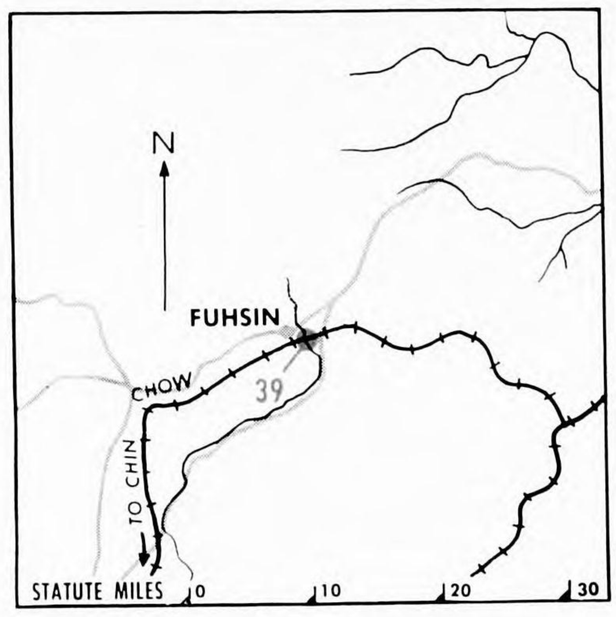
PHOTO 81—Hulutao—TARGET 172 Hulutao Port Facilities.

CONFIDENTIAL equals British Confidential

MANCHURIA AREAS NOS. 93.1, 2, 3, 4, 5 GENERAL PHOTOS (OUTLYING)

3654—53—Manchuria—12-11-44 First Proof

PHOTO 82—Chinchou.



TARGET 93.3— 39

FUHSIN STEAM POWER PLANT

FUHSIN

(ELECTRIC POWER)

42° 06′ N 121° 38′ E (Approx)—Cap 162,000 KW. Three stacks and at least three cooling towers. Supplies power for coal mines in Fuhsin district and may now be connected with Manchuria network. Exact location unknown.

TARGET 93.3— 175

MANCHURIA SYNTHETIC FUEL CO

(Manshu Gosei Nenryo)

CHINCHOW

(PETROLEUM)

41° 07′ N 121° 06′ E (Approx)—New synthetic oil plant believed completed about 1941. Estimated 1942 production approx 219,900 bbls of oil products by the Fischer-Tropsch hydrocarbon synthesis process with reported expansion to an estimated 1944 production of approx 733,000 bbls. This would account for 4% of estimated total Inner Zone oil production. Located about 2 mi NW of Chinchow.

3654-464—Manchuria—12-11-44—First Proof

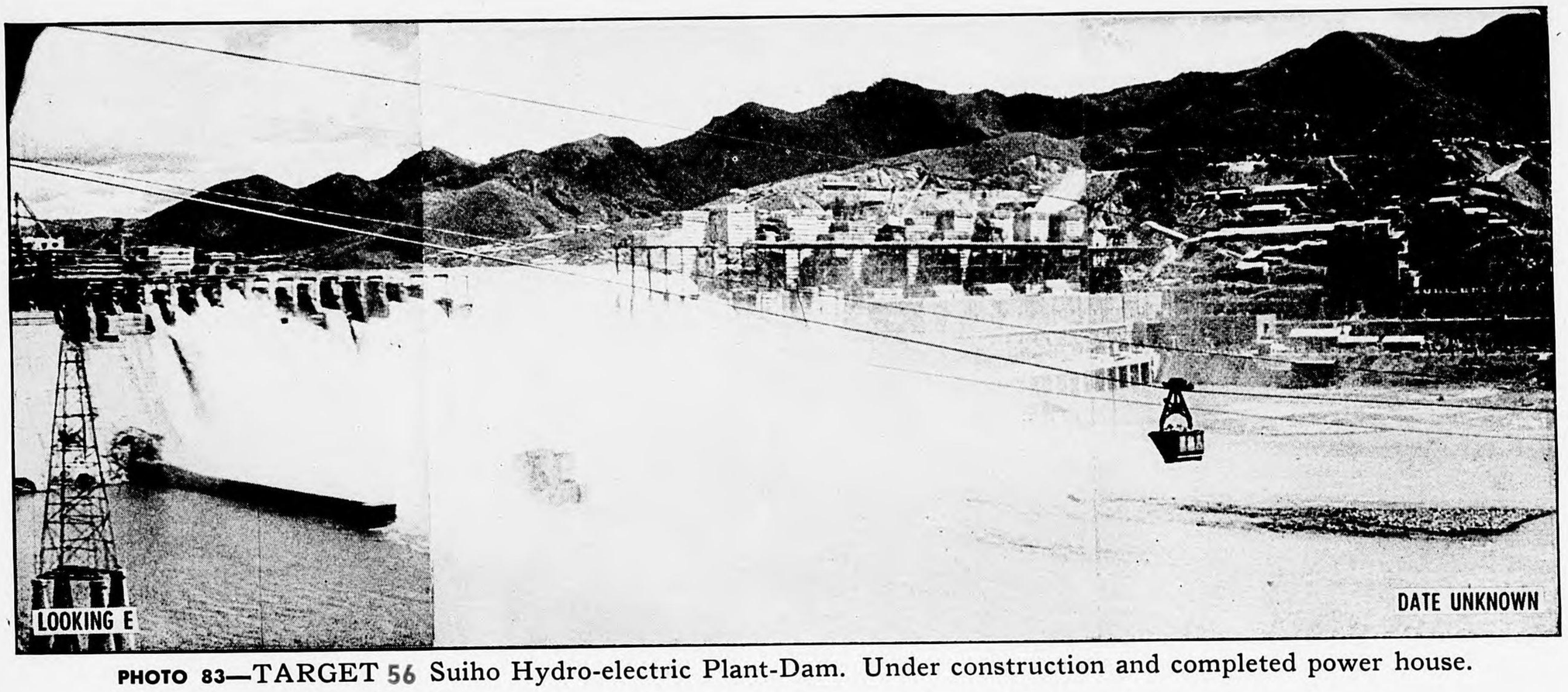
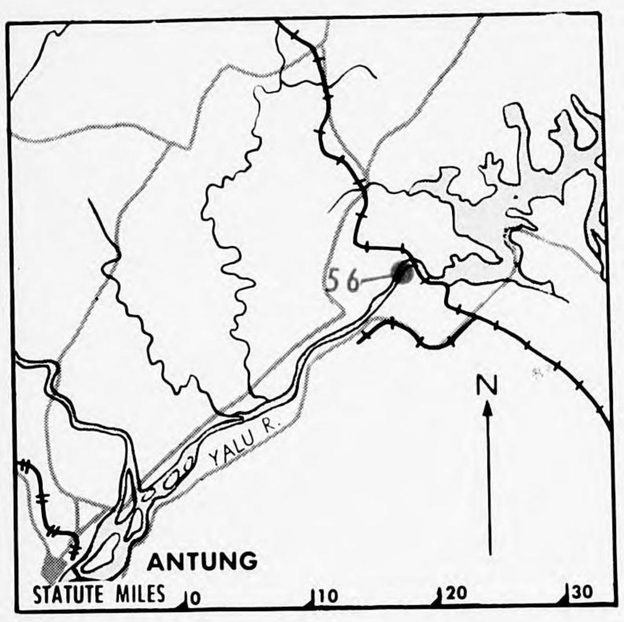
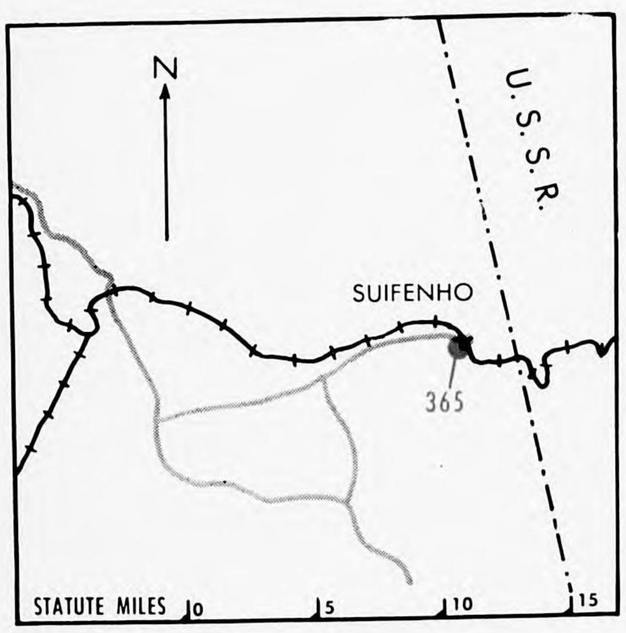
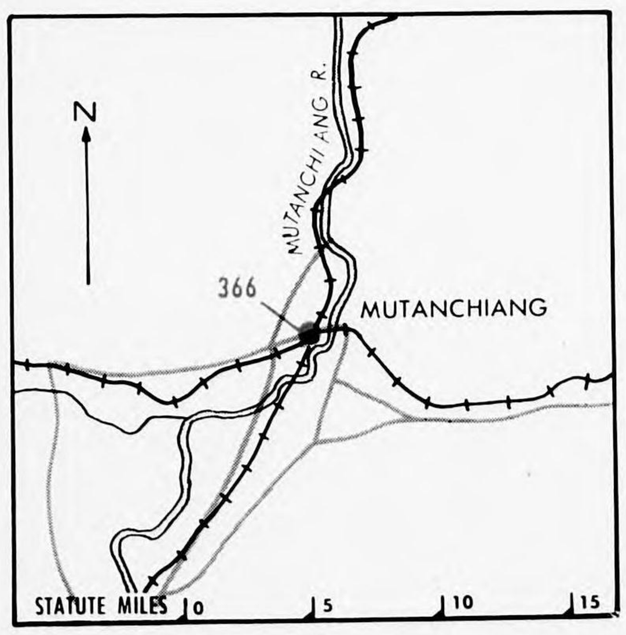


PHOTO 83—TARGET 56 Suiho Hydro-electric Plant-Dam. Under construction and completed power house.







TARGET 93.2— **56**

SUIHO HYDRO-ELECTRIC PLANT

SUIHO

(ELECTRIC POWER)

40° 27′ N 124° 55′ E (Approx)—Largest hydro-electric development in Far East. Present cap 450,000 KW, of which 270,000 KW is available to Manchuria Power Network. Completed project to have seven 90,000 KW generators of which four and probably five now in operation. Concrete dam, approx 300 ft high and 3100 ft long, forms a 300 billion gal reservoir, sufficient to impound 35% of annual Yalu River runoff, permitting full operation throughout winter dry season. When full, reservoir is approx 400 ft above sea level and extends over 40 mi up Yalu River Canyon.

Overflow section of dam is located on Manchurian side. 575 ft by 100 ft generator bldg is along down-stream edge of dam on Korean side. Turbo-generators are vertically mounted with practically all vital equipment below floor level. Penstocks approx 35 ft in diameter enter upstream face of dam 90 ft below full reservoir level, carrying water through dam to each turbine. Penstock entrances are protected by emergency gates and removable trash racks.

Control equipment housed in three-story, 60 by 150 ft structure adjoining generator bldg along Korean shore. Between control bldg and Suiho Village to SW, outdoor transformers and switch gear cover an area 250 ft and 1200 ft. An alternate route to main Heijo-Mukden RR crosses Yalu River on the Suiho Dam.

(See photo 83; map on page M-15.)

TARGET 93.2— **365**

SUIFENHO RR REPAIR SHOPS & YARDS

SUIFENHO

(TRANSPORTAITON)

44° 24′ N 131° 09′ E (Approx)—Small repair shops primarily of local importance. Freight yards.

TARGET 93.2— **366**

MUTANCHIANG RR YARDS

MUTANCHIANG

(TRANSPORTATION)

44° 35′ N 129° 37′ E (Approx)—Reported sizeable yards serving important military area.

3654—65—Manchuria—12-11-44—First Proof

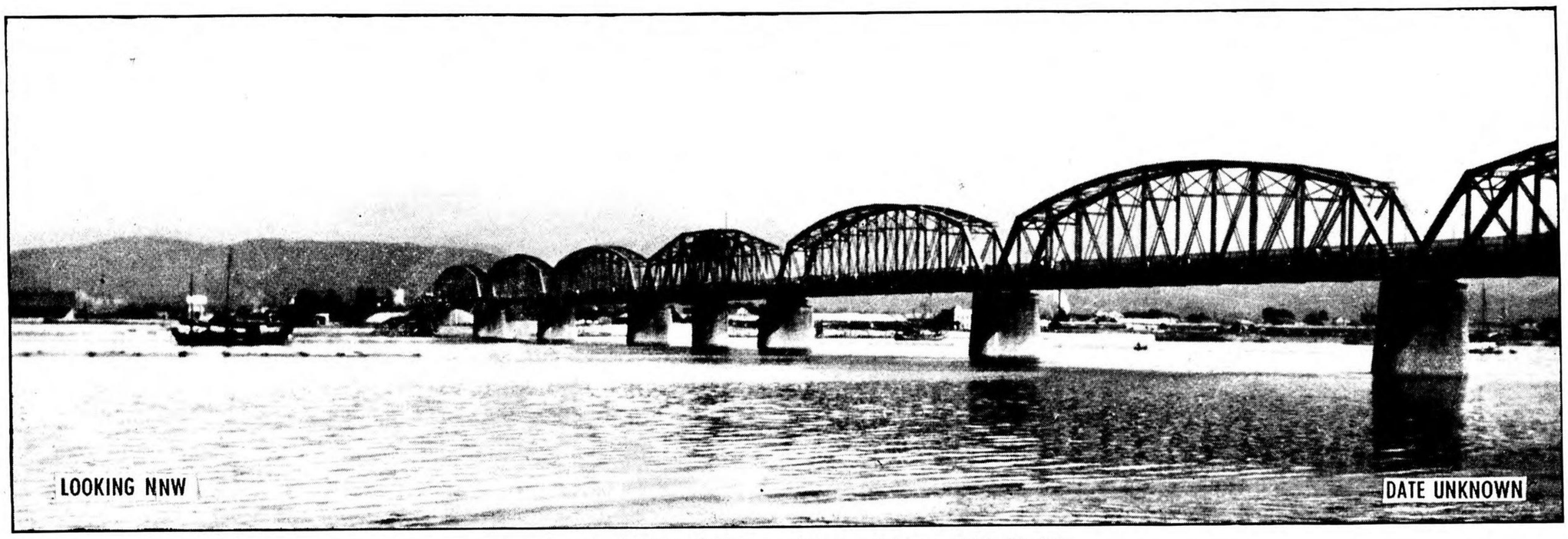


PHOTO 84—TARGET 77 Yalu River RR Bridge.

TARGET 93.2— 77

YALU RIVER RR BRIDGES

ANTUNG

(TRANSPORTATION)

40° 07′ N 124° 23′ E (Approx)—Two single track bridges between Antung and Shingishu (Korea) on main line between Mukden and Fusan. Old bridge 3000 ft long, 13 steel spans, central drawspan 300 ft, stone piers. New bridge parallels old.

(See photos 84, 85 and 86; maps on pages M-13 and M-14.)

TARGET 93.2— 72

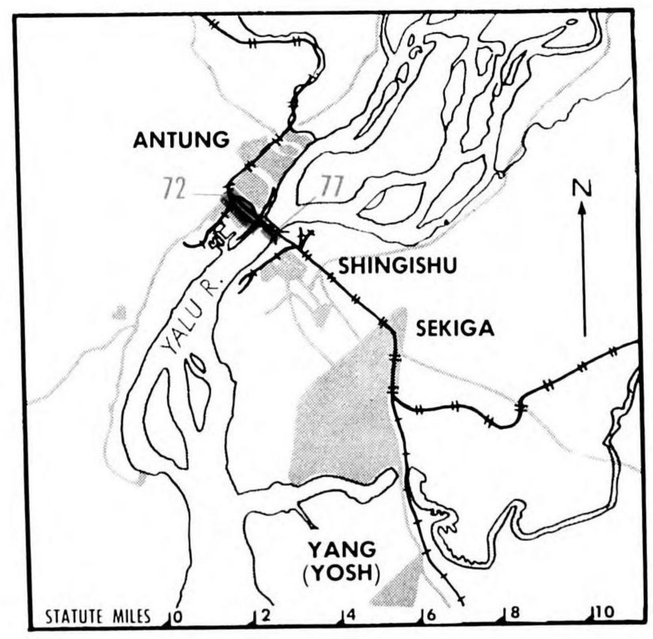
ANTUNG RR YARDS

ANTUNG

(TRANSPORTATION)

40° 07′ N 124° 22′ E (Approx)—Handles traffic between Mukden and Korea. Increased in importance if coastal line S through Tatung to Dairen, line N to Tunghua, and double tracking to Mukden are completed. Small repair shops, roundhouse.

(See maps on pages M-13 and M-14.)



MANCHURIA AREAS NOS. 93.1, 2, 3, 4, 5 TARGETS 77, 72 (OUTLYING)

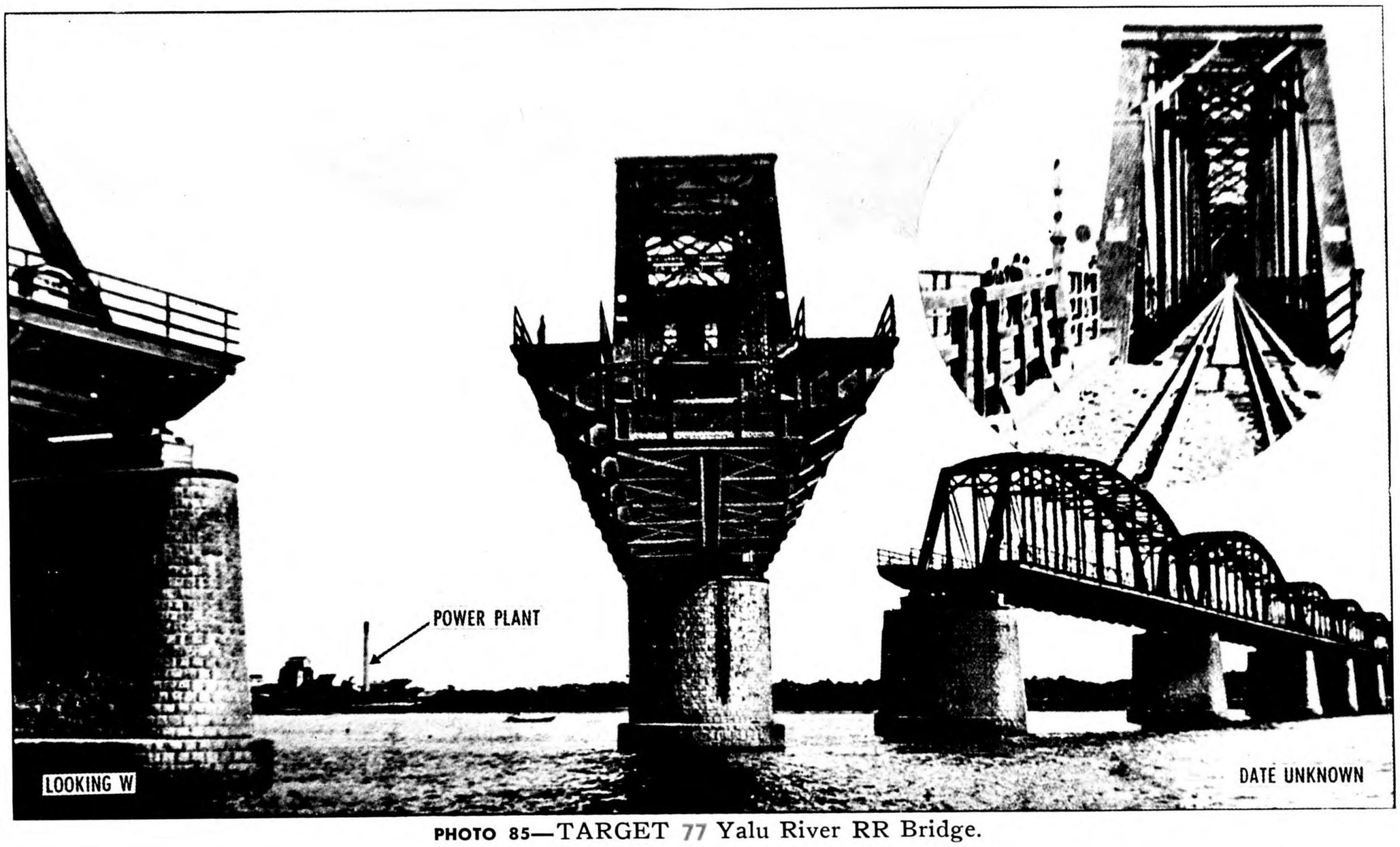


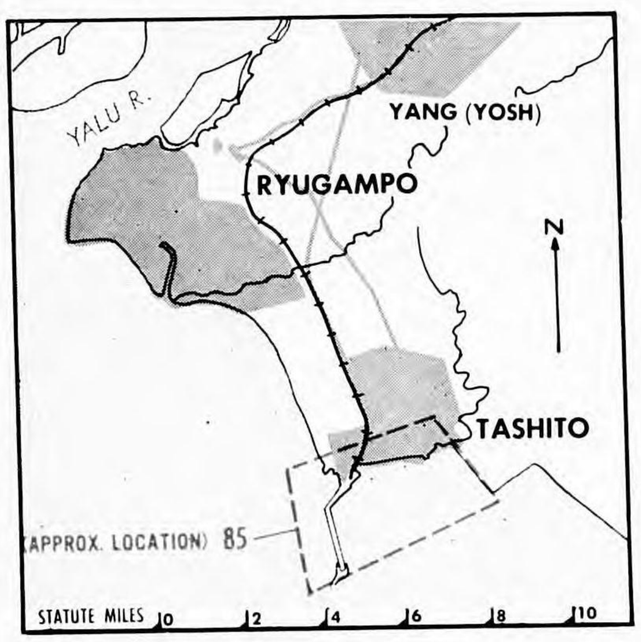
PHOTO 85—TARGET 77 Yalu River RR Bridge.

3654—66—Manchuria—12-11-44—First Proof

CONFIDENTIAL equals British Confidential

MANCHURIA AREAS NOS. 93.1, 2, 3, 4, 5 TARGETS 77, 72 (OUTLYING)

PHOTO 86—Shingishu—TARGET 77 Yalu River RR Bridge.



TARGET 93.2— **85**

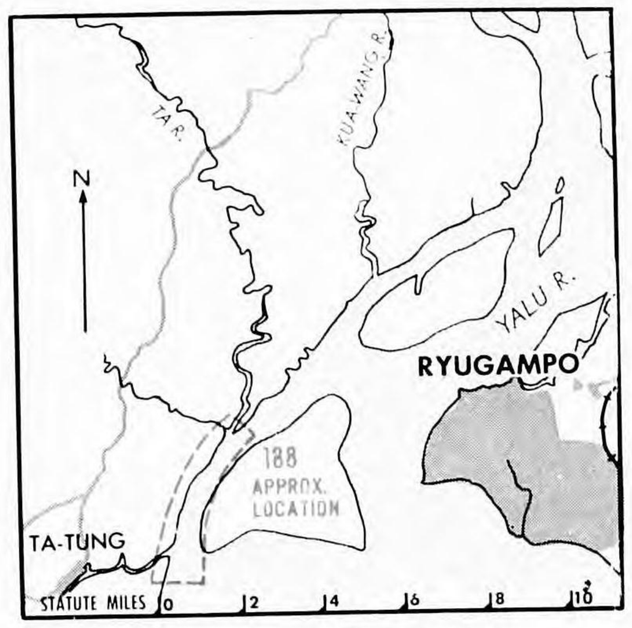
TASHITO HARBOR FACILITIES

TASHITO

(HARBOR FACILITIES)

39° 50′ N 124° 25′ E (Approx)—New port on Korean side at mouth of Yalu River estuary 20 mi S of Antung and connected by rail with Antung/Shingishu. Causeway from mainland to Tashito Is one mi offshore, half finished in 1941. Reported 1943 that ocean-going vessels could be brought alongside new wharves equipped with freight sheds and cargo cranes. Electric power from Suiho power plant (TARGET 56). Port ice-free in winter. Tashito Is reported fortified.

(See map on page M-13.)



TARGET 93.2— **188**

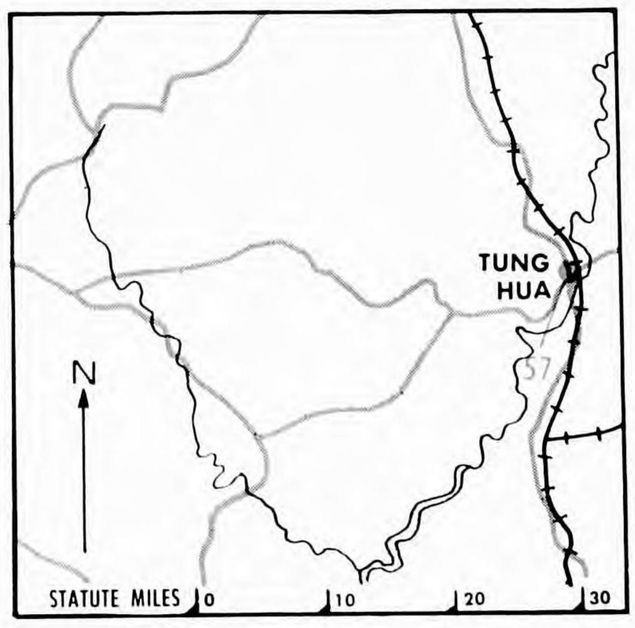
TATUNG HARBOR FACILITIES

TATUNG

(HARBOR FACILITIES)

39° 54′ N 124° 11′ E (Approx)—New port on Manchurian side of Yalu River estuary about 15 mi S of Antung. Eight year construction plan began 1939, planned for 2,000,000 ton cap and deepwater vessels. Reported 1943 that 20 per cent construction was completed and rail connections would be ready by Spring 1944. Harbor is ice-free but silts heavily. Construction involved extensive drainage and dredging. Coastal RR from Dairen to Antung under construction, passes through Tatung.

(See map on page M-13.)



TARGET 93.2— **57**

TUNGHUA STEEL WORKS

ERHTAOKOU (E of Tunghua)

(IRON AND STEEL)

41° 44′ N 126° 01′ E (Approx)—New Plant. Installations reported for 1941/42 completion: four electric blast furnaces, cap 132,000 metric tons pig iron; electric steel furnaces, cap 95,000 metric tons; one battery 36 coke ovens, carbonizing cap 259,000 metric tons; reported steam power plant, cap 71,000 KW. Additional power believed transmitted from Suiho Hydro-electric Plant (TARGET 56).

3654—67—Manchuria—12-11-44—First Proof

PHOTO 87—Kirin—TARGET 364 Kirin RR Yards and Repair Shops.

TARGET 93.2— 364

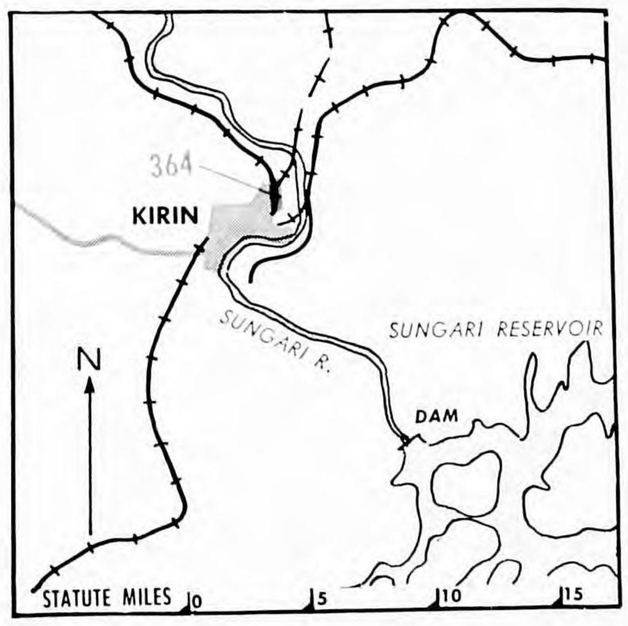
KIRIN RR YARDS & REPAIR SHOP

KIRIN

(TRANSPORTATION)

43° 51′ N 126° 33′ E (Approx)—Freight yards at junction of lateral rail line from Hsinking to Tumen and Rashin, and line S to Mukden. Medium-size repair shops of local importance. Locomotive shed.

(See photo 87; map on page M-18.)



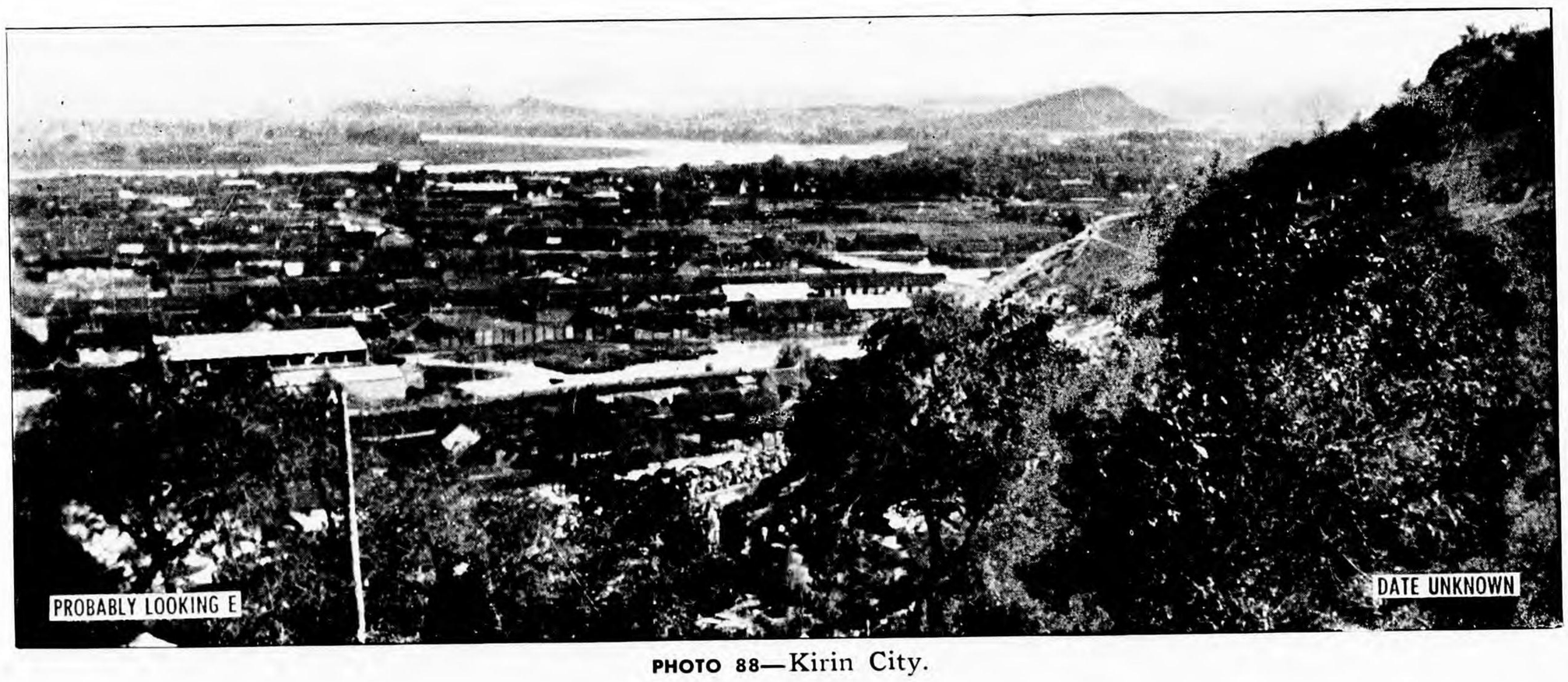


PHOTO 88—Kirin City.

3654—68—Manchuria—12-11-44—First Proof

CONFIDENTIAL equals British Confidential

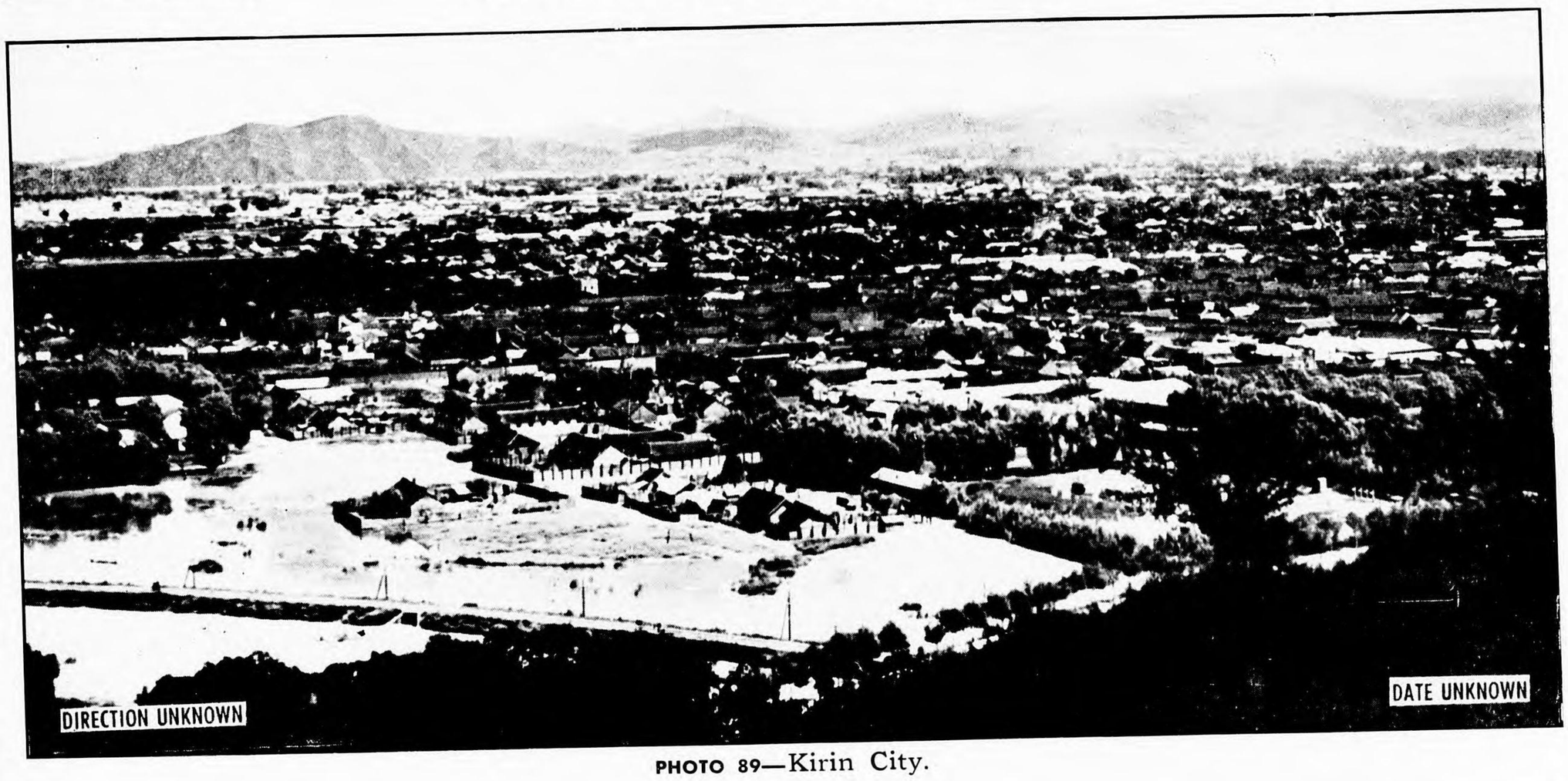


PHOTO 89—Kirin City.

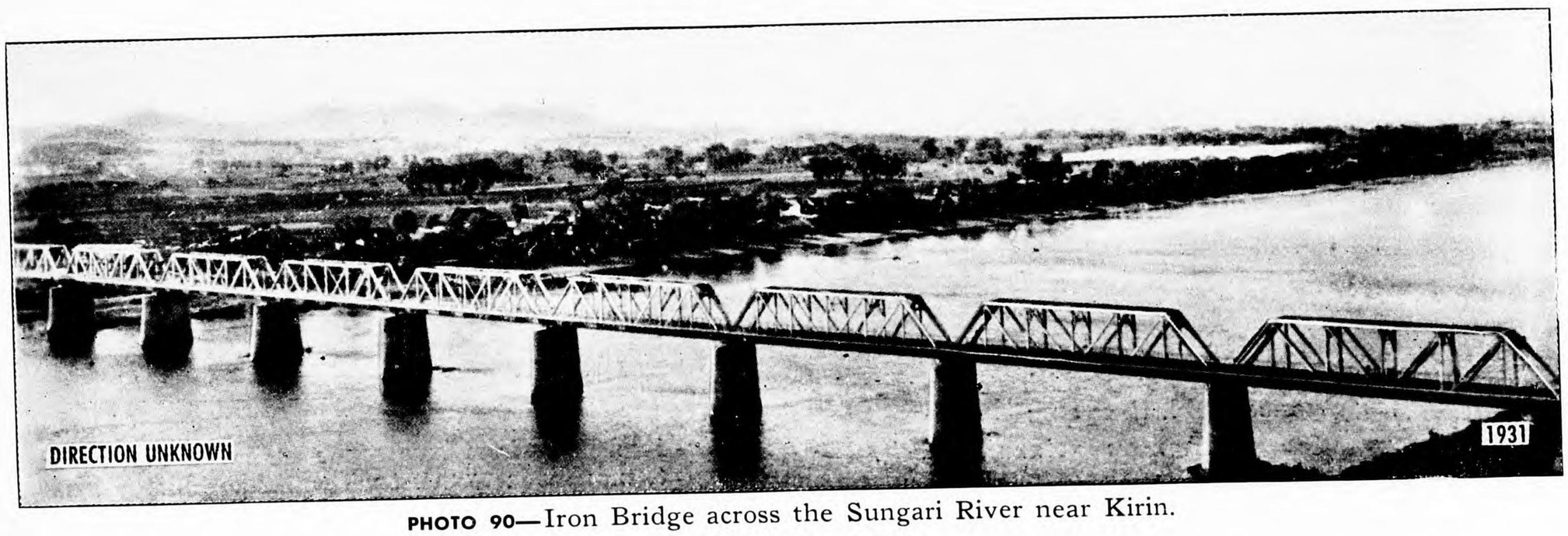
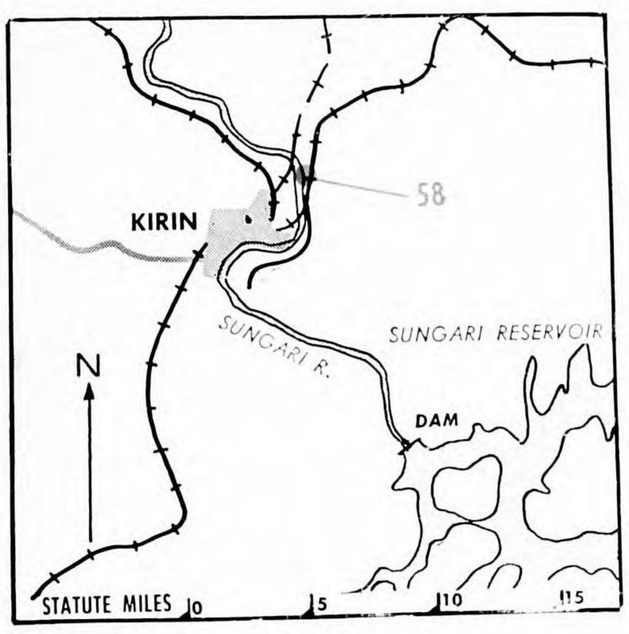
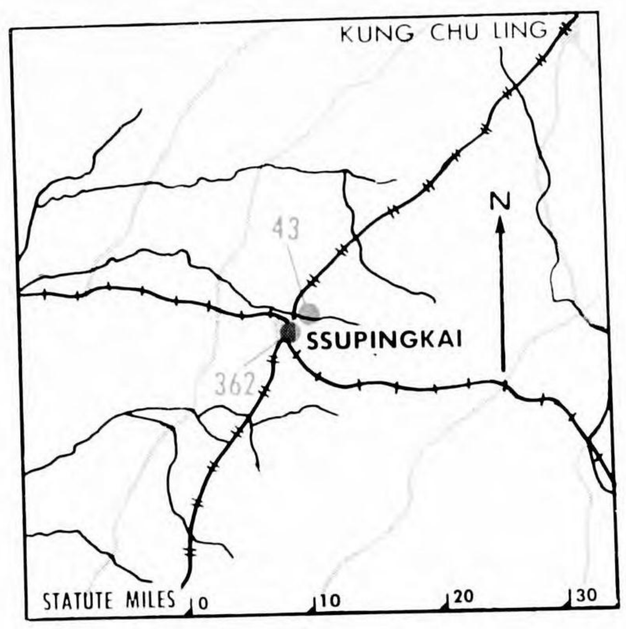


PHOTO 90—Iron Bridge across the Sungari River near Kirin.





TARGET
93.2—
58

KIRIN ARTIFICIAL OIL CO

(Kirin Jinzo Sekiyu KK)

LUNGTANSHAN

(PETROLEUM)

43° 50′ N 126° 35′ E (Approx)—Rated largest synthetic oil plant in Japanese Empire, second to SMR Shale Cil Plant in output. New plant reported completed in 1941. Estimated 1943 production 1,200,000 bbls of oil products. Reported increasing production in 1944, accounting for approx 10% of total Inner Zone oil production. Dependent for electric power on new Kirin Hydro-Electric Power Plant (TARGET 55). Exact location of oil plant uncertain.

TARGET
93.2—
43

MANCHURIA COAL LIQUEFACTION CO

(Manshu Yuka Kogyo KK)

SSUPINGKAI

(PETROLEUM)

43° 12′ N 124° 22′ E (Approx)—Began operations in 1939 with an estimated production of 60,000 bbls of oil products by low temperature carbonization and hydrogenation. Plant reported expanded. Plant occupies site about ½ mi E of SMR tracks outside northern boundary of city. Believed to be on S side of river. Compound includes red brick oil refinery bldgs two 100-foot smokestacks, and three large tanks.

TARGET
93.3—
362

SSUPINGKAI RR YARDS & REPAIR SHOPS

SSUPINGKAI

43° 11′ N 124° 21′ E (Approx)—Important freight yards at junction with lines N to Tsitsihar and Harbin, S to Mukden and Korea. Small locomotive repair shops of local importance.

5654—69—Manchuria—12-11-44—First Proof

MANCHURIA AREAS NOS. 93.1, 2, 3, 4, 5 TARGETS 58, 43, 362 (OUTLYING)

CONFIDENTIAL equals British Confidential

CONFIDENTIAL equals British Confidential

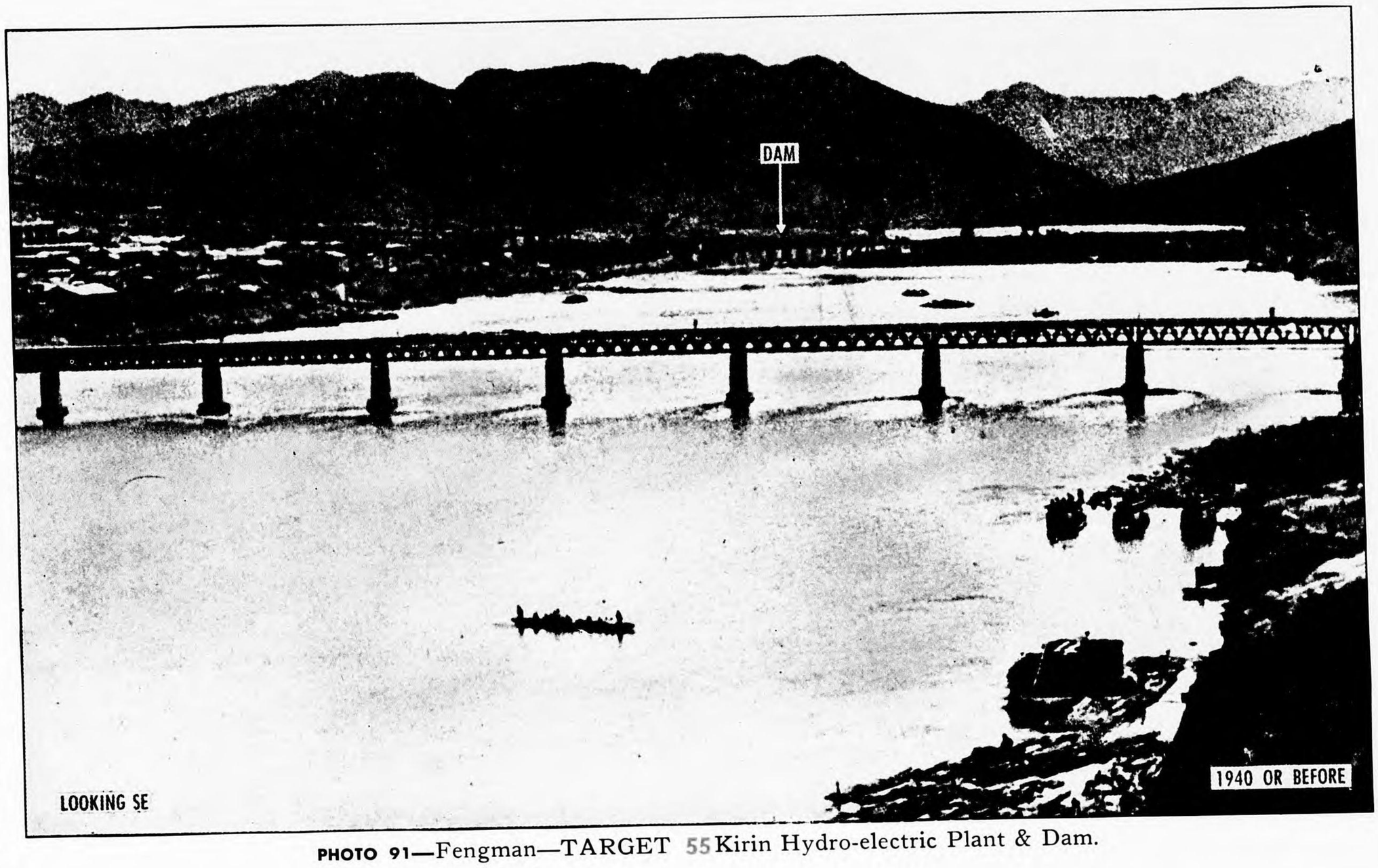


PHOTO 91—Fengman—TARGET 55 Kirin Hydro-electric Plant & Dam.

TARGET 93.2— 55

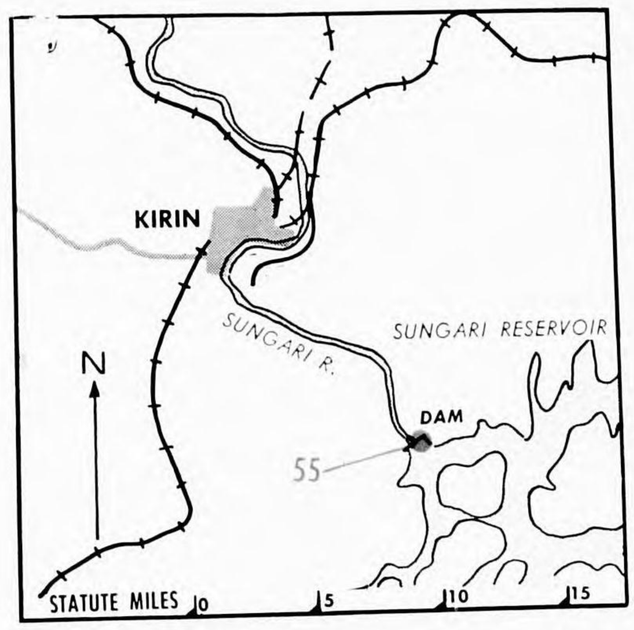
KIRIN HYDRO-ELECTRIC PLANT

FENGMEN

(ELECTRIC POWER)

43° 42′ N 126° 41′ E (Approx)—One of two largest hydro developments on Asiatic Mainland. Present cap 300,000 KW, supplying Kirin, Hsinking, Harbin, and Mukden districts. Ten 60,000 KW generators projected, of which five are believed to be in operation. Concrete dam approx 250 ft high and 3600 ft long forms 285 billion gal reservoir, sufficient to permit full operation throughout winter dry season. When full, reservoir is approx 870 ft above sea level and extends 100 mi above dam. Overflow section of dam located on W side. 600 by 100 ft power house located along downstream edge of dam near E bank of Sungari River. Turbo-generators are vertical-mounted with most vital equipment below floor level. Penstocks approx 30 ft in diameter enter upstream face of dam 110 ft below full reservoir level, carrying water through dam to each turbine. Penstock entrances are protected by emergency gates and removable trash racks. Transformers and switch gear located directly N of power house on downstream face of dam. RR leads 13 mi SE from Kirin along E bank of Sungari River to TARGET 55. Highway bridge crosses the Sungari River ½ mi below dam.

(See photos 91 and 92.)



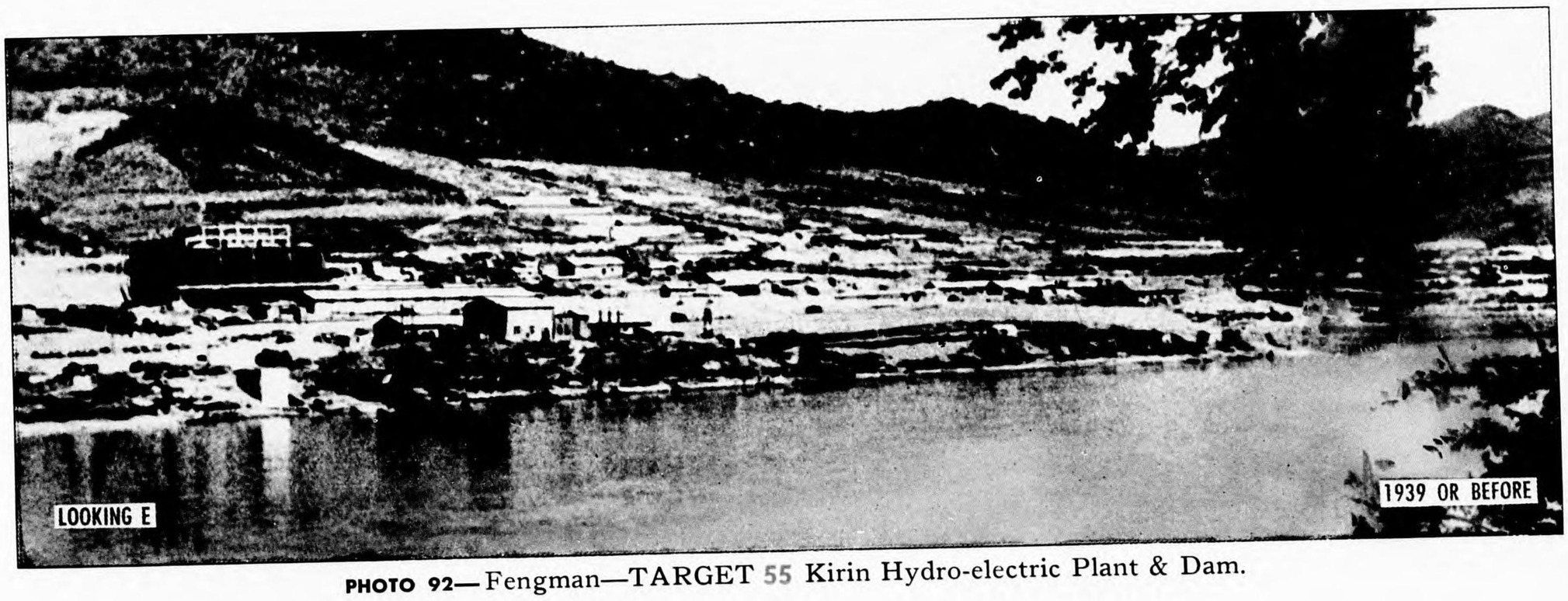


PHOTO 92—Fengman—TARGET 55 Kirin Hydro-electric Plant & Dam.

3654—70—Manchuria—12-11-44—First Proof

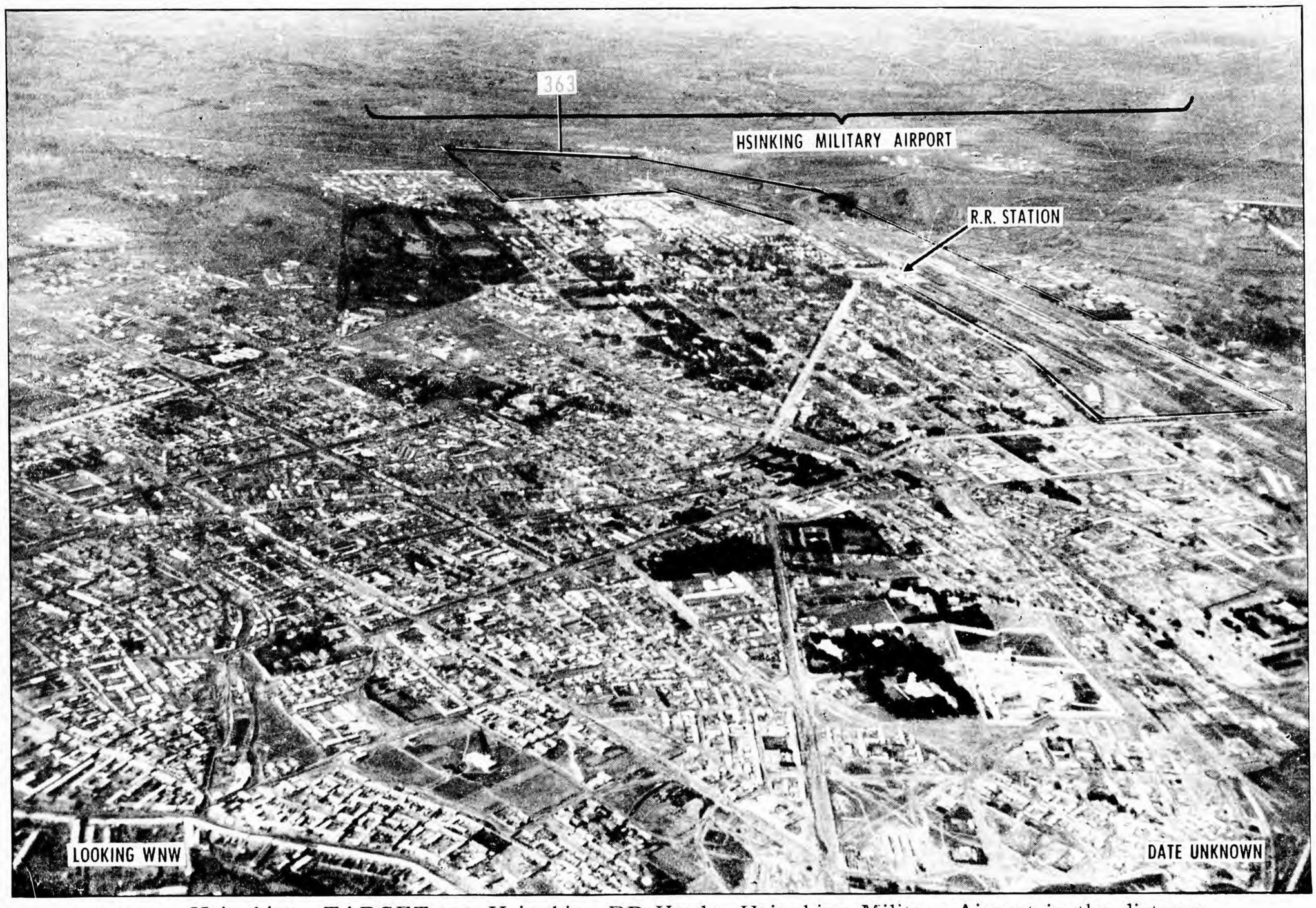
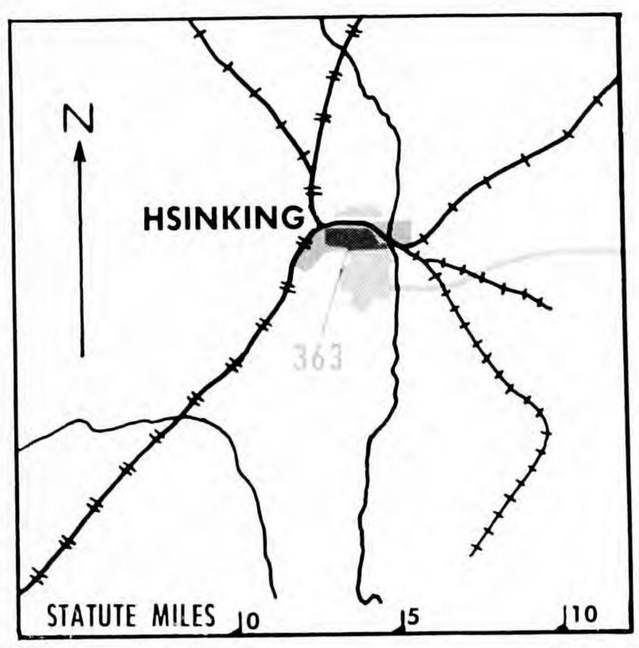


PHOTO 93—Hsingking—TARGET 363 Hsingking RR Yards. Hsingking Military Airport in the distance.



TARGET 93.3— 363

HSINKING RR YARDS

HSINGKING

(TRANSPORTATION)

43° 54′ N 125° 19′ E (Approx) Freight yards at railway center, junction of double track Harbin-Mukden line and Halun Arshan - Tumen lateral line. Roundhouses.

(See photos 93, 95 and 96; map on page M-16.)

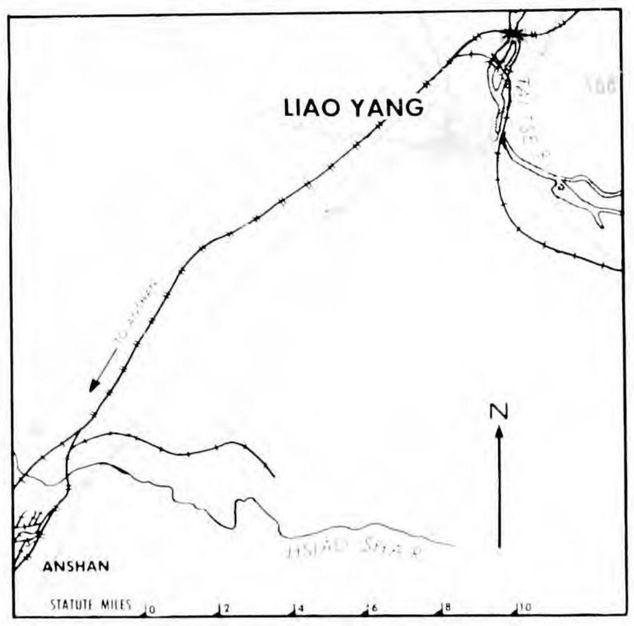
TARGET 93.3— 368

TAISHI RIVER RR BRIDGES

LIAOYANG

(TRANSPORTATION)

41° 18′ N 123° 12′ E (Approx) Multi-span parallel single-track steel bridges over Taishi River just N of Liaoyang. Carry heavy coal traffic from Fushun to Anshan and main line Mukden-Dairen.



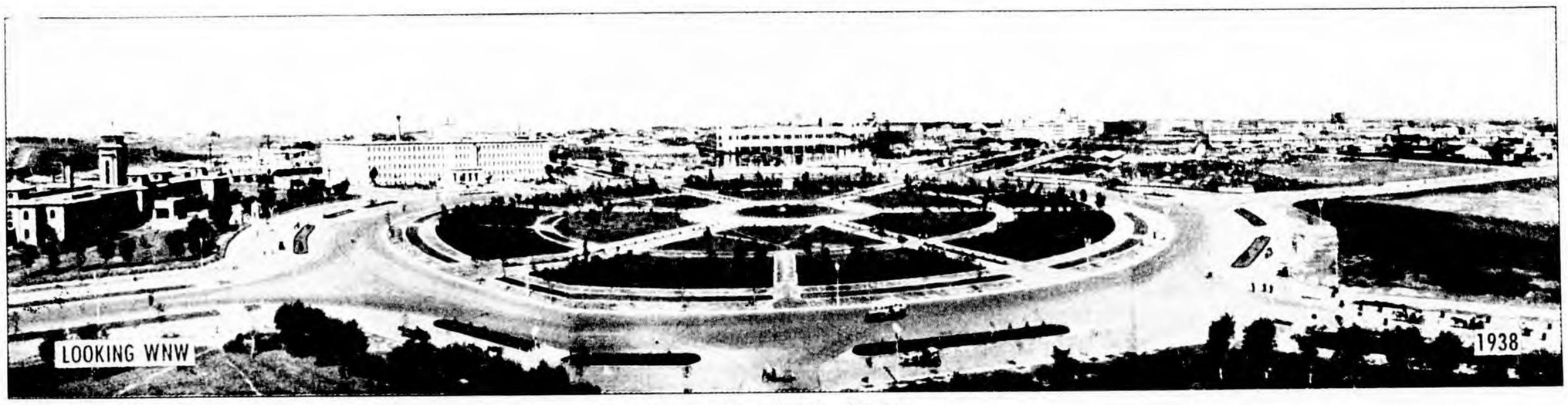


PHOTO 94—Hsingking.

CONFIDENTIAL equals British Confidential

PHOTO 95—Hsingking—TARGET 363 Hsingking RR Yards Freight classification yards and roundhouses just off photo on left.

MANCHURIA AREAS NOS. 93.1, 2, 3, 4, 5 GENERAL PHOTOS (OUTLYING)

PHOTO 96—Hsingking—TARGET 363 Hsingking RR Yards. Freight classification yards and roundhouses just off photo on right.

9654—72—•Manchuria—12-11-44—First Proof

MANCHURIA AREAS NOS. 93.1, 2, 3, 4, 5 GENERAL PHOTOS (OUTLYING)

CONFIDENTIAL equals British Confidential

WEATHER INFORMATION, MANCHURIA

The climate of Manchuria is continental in character, with cold, dry winters and hot, humid summers. In the coastal regions around Liaotung Gulf and the Sea of Japan, the cold Northwest Monsoon reaches considerable strength during November, December and January, and the Southeast Monsoon produces a marked increase in cloudiness, precipitation, and coastal fog during June, July and August. During the summer monsoon season an occasional typhoon invades the coastal areas of Manchuria, producing winds of 60 m.p.h. or over. The spring months are characterized by rapidly rising temperatures, steep lapse rates, frequent cold frontal passages, and attendant local or widespread duststorms which sometimes contaminate the air up to 15,000 feet.

For the purposes of aerial observation and bombing, the best season over the entire area is winter; in the southern portion it is best from mid-September through February, and in the central and northern portion from November through March. During this season high or low-level bombing could be carried out on from 15 to 25 days a month. The chief limitations at this season are: occasional ground or ice-fog, spring duststorms, infrequent snow squalls, extreme cold in the interior, and moderately cold but icy winds in the maritime regions.

The worst season for aerial operations, especially bombing, is summer. At this season because of excessive cloudiness and rainfall, icing at high levels, occasional typhoons and sea fogs in the coastal areas, bombing could be carried out on from 2 to 10 days a month.

This report is written primarily to show the general climatic characteristics of Manchuria or Manchukuo which might affect air operations, particularly bombing missions over that region. The most useful data for planning such operations, namely, information on ceiling and visibility frequencies are not available for this region which has been Japanese-controlled since aviation and aviation weather reporting reached their full development. Some ceiling and visibility data are available for major airports in maritime U.S.S.R., and inferences as to conditions in nearby Manchuria may be drawn from this data. Inclusion of data from Soviet stations should not be construed as indicating intention to operate over those areas, but rather as the only means of supplementing the meager data from enemy occupied regions.

A great number of weather reporting stations are located in Manchuria (figure 1; table 1), but most of the data obtained from these stations are for temperature and precipitation only. Many of these stations, therefore, will not appear in this report, except in the station location table. The stations which have the longest and best records are located, for the most part, in the principal cities and towns. These are situated at low elevations, generally along the railway lines which traverse the broad valleys. Very scanty records are available from vast mountain or desert regions such as Jehol, northern Liaoning, northern Heilungkiang, and eastern Kirin; but since these regions are largely uninhabited, and hence not known target areas, a detailed knowledge of local climatic conditions is not essential. Considerable statistical data are available for the major target areas such as Dairen, Mukden, Antung, Changchun (Hsingking), Harbin, and Lungkiang, showing diurnal, monthly and annual variations in wind, cloudiness, cloud types, temperature frequencies, etc. In a report of this size it is impossible to present much of these data, or to interpret or portray visually an appreciable part of the available material. Moreover, this is not necessary since the climate of Manchuria is continental and fairly uniform in character over extensive areas. Thus, data given for one or two sample stations can be interpreted as representative of other stations in that general region.

GENERAL CLIMATIC CONTROLS

Atmospheric Controls: The weather in Manchuria is controlled in winter by the cold, vast and sometimes intense high pressure cell which is centered at that season over Siberia, Mongolia, or Manchuria (figure 2).* In summer the major control is the deep, warm North Pacific *High* (figure 3).†

The Siberian *High* gives rise to the winter or Northwest Monsoon along the entire coast of east Asia, as the cold, dry air from the interior plateaus and valleys flows toward the low pressure area which overlies the warm waters of the Kuroshio and its extensions toward the northwest, north and northeast.

The Pacific *High* constitutes the source of the summer Southeast Monsoon, as the air from the warm, tropical or subtropical waters flows northward and into the low pressure area which obtains over the plains and plateaus of east Asia.

In winter the polar front lies well to the south and east of Manchuria. In fact, much of the time the plains of Manchuria lie in the center of the so-called Siberian Anticyclone, so that no frontal movements take place there for days or even weeks.

In spring the polar front extends from the western mountains of China across central or northern China, the Yellow Sea, Chosen and the Sea of Japan, so that occasional cyclonic storms cross just to the south of, or over southern Manchuria. At this time air-mass changes become increasingly frequent as the Siberian Anticyclone breaks down and the Pacific *High* moves gradually northward.

In summer the major frontal zone lies across the sub-arctic regions of northern Manchuria, or east-central Siberia, The Sea of Okhotsk and the Bering Sea. Winds are predominantly from the southeast, south, or southwest over the major portion of Manchuria; storms are more local and limited in area and winds not so persistent.

The fall situation differs from the spring, in that the southward movement of the Arctic Front is more spasmodic and series of cyclonic storms in the continental regions are not so frequent as in spring.

LOCAL CONTROLS OF WEATHER

Physiography: The climate of the various parts of Manchuria is remarkably uniform, in spite of the wide variety of topography resulting from the mountainous nature of much of that region. Nevertheless, there are some local peculiarities of climate which can be explained only by the nature of the terrain.

The broad Amur River and its tributary, the Argun, form the northern boundary of Manchuria. The Yablonovy, to the northwest, and several ranges to the north of the Amur Valley, provide protection for extreme northern Manchuria from the numerous shallow, cold waves which render the valley of the Lena almost uninhabitable. Some of the deeper masses of Arctic air override these ranges which are 5000 to 8000 feet in elevation, so that the Amur Valley sometimes experiences extremely cold weather in winter.

The Great Plain of Manchuria, which is formed by the upper valleys of the Nonni, the Sungari and the Lao Rivers, is further protected from the extremely cold, fast moving, Arctic air masses and the attendant blizzards, by the Great Khingan Range which separates it from the Agun Valley to the northwest, and by the Little Khingan Range to the northeast which divides the central plain from the broad Amur Valley. To the southeast of the vast plain, a broad series of ranges rising to 9000 feet in places, blocks the movement of maritime air masses from the Sea of Japan and the East China Sea. In summer a great deal of moisture surmounts or circumvents these ranges but in the winter half of the year very little moist air reaches the interior valleys, and the southwest portion of the Great Plain is so dry that it is known as the Eastern Gobi Desert. Liaoning Peninsula and the adjacent region are further protected from moist air masses from the southeast by ranges of considerable altitude forming the backbone of Chosen. Jehol Province is mostly mountainous; an extension of the Great Khingan Shan reaches southward almost to Peiping. Peaks in Jehol rise to nearly 7000 feet, but much of the region is low enough to allow huge clouds of dust to come from Mongolia across into Southern Manchuria.

Ocean currents: The northward flowing Kuroshio does not approach the borders of Manchuria close enough to affect anything but the general circulation of the region as a whole. Since prevailing winds for most of the year are offshore or northwesterly, the effect of the bordering seas is minimized. The Yellow Sea, however, does exercise a minor control over the weather on Liaotung Peninsula, which receives onshore winds from the east through the northwest. A more pronounced maritime influence would be felt there if the overwater trajectory were longer and the Yellow Sea and its gulfs deeper. As it is, the surrounding waters of Liaotung Wan and Nishi Chosen Wan are cold or frozen much of the year.

The Sea of Japan approaches eastern Manchuria near Vladivostok, but the coastal mountain ranges rising to from 4000 to 9000 feet reduce the maritime influence. Furthermore, along the immediate coast of Siberia and Chosen a persistent northerly current cools the overlying atmosphere and produces stability phenomena such as subsidence, clear skies, temperature inversions and surface fog. This stability limits the advection of maritime air upward and inland as effectively as would another mountain range parallel to the coast.

CLOUDINESS AND CEILINGS

Cloudiness: Winter is the season of least cloudiness (figure 4; table 2),* and of the greatest number of clear days (figure 5; table 3).† During January, the average cloudiness is greatest in the eastern mountains and least in Jehol and the northern portion of Liaoning. At Taonan, Linsi and Peiping, December shows even less cloudiness than January, the average cloudiness being about 20 percent during that month in these semiarid regions. Clear days occur well over half of the time in winter in the southwestern part of Manchuria, but less than 25 percent of the days in the same season at such stations as Taipingling and Yenki in the southeastern portion of Manchuria. Even there the skies in winter are usually only partly cloudy, for just 7 or 8 days a month are cloudy (table 4).‡ In the remainder of Manchuria only 2 to 4 days a month are cloudy during an average winter.

In the summer, on the other hand, clear days are even more rare than cloudy days are in winter. Many of the stations in eastern Manchuria average only one or less than one day a month with 2/10 or less cloudiness, and the majority of the stations at low elevations in the drier sections have only 4 or 5 clear days each month in summer. Cloudy days occur most frequently in July, at which time about half of the days in the month are cloudy. At Taipingling July averages 20 cloudy days and at Notre Dame des Pins, a mountain station in southwest Liaoning, there is an average of only 9 cloudy days in the same month.

*Figure 2, page 76.
†Figure 3, page 77.

*Figure 4, page 78; Table 2, page 89.
†Figure 5, page 79; Table 3, page 89.
‡Table 4, page 90.

3654 ~~3630~~—73—Manchuria— 7-11-44—First Proof

WEATHER INFORMATION, MANCHURIA—Continued

Table 1.—Station Location Table with Elevations and Length of Record

Station	Province	Lat.	Long.	Elev.	Longest Record
MANCHURIA (Manchukuo)					
Ailtun (Aigun)	Heilungkiang	49°58′N	127°35′E	446 ft.	1910-1932
Anida	Heilungkiang	46°24′N	125°19′E	483	1922-1928
Antung (Ngantong)	Liaoning	39°59′N	124°30′E	26	1907-1932
Chalantun (Yalu)	Heilungkiang	48°01′N	122°44′E	1035	1909-1928
Changchun (Hsinking)	Kirin	43°55′N	125°18′E	704	1909-1936
Changkiawan (Taomen)	Kirin	44°32′N	125°43′E	585	1914-1928
Chanheou	Jehol	41°00′N	120°10′E	——	1905-1911
Chengchiatun (Liaoyuan)	Liaoning	43°31′N	123°29′E	393	1913-1935
Dairen	Kwantung	38°54′N	121°38′E	315	1905-1936
Fenghuangcheng	Liaoning	40°26′N	124°02′E	240	1926-1935
Hailar (Hulun)	Heilungkiang	49°14′N	119°43′E	2000	1909-1928
Hailun	Heilungkiang	47°26′N	126°58′E	842	1934-1935
Hailung	Liaoning	42°26′N	125°55′E	951	1930-1935
Harbin (Pinkiang)	Kirin	45°45′N	126°38′E	494	1909-1928
Hsiungyaocheng	Liaoning	40°13′N	122°11′E	86	1914-1935
Ilan (Sansing)	Kirin	46°20′N	129°33′E	328	1916-1928
Imienpo	Kirin	45°04′N	128°04′E	690	1909-1928
Kaiyuan	Liaoning	42°36′N	124°04′E	305	1926-1935
Kirin	Kirin	43°48′N	126°22′E	689	1911-1913
Kungchuling	Liaoning	43°31′N	124°48′E	699	1915-1935
Linsi	Jehol	43°30′N	118°01′E	2300	1929-1935
Lungkiang (Tsitsihar)	Heilungkiang	47°10′N	123°49′E	490	1914-1935
Manchouli	Heilungkiang	49°35′N	117°26′E	2133	1909-1928
Mientuho	Heilungkiang	49°06′N	121°03′E	2313	1909-1928
Mukden (Shenyang)	Liaoning	41°48′N	123°23′E	144	1906-1936
Ningan	Kirin	44°35′N	129°36′E	791	1909-1928
Notre Dame des Pins	Liaoning	41°23′N	120°37′E	348	1908-1911
Pokotu (Behudo)	Heilungkiang	48°46′N	121°55′E	2279	1914-1928
Port Arthur (Ryojun)	Kwantung	38°47′N	121°16′E	260	1906-1936
Ryuseison	Kirin	42°46′N	129°24′E	82	15 yrs.
Taipingling	Kirin	44°33′N	130°41′E	1840	1909-1928
Taonan	Liaoning	45°20′N	122°47′E	503	1928-1932
Tunhua	Kirin	43°23′N	128°22′E	1634	1930-1935
Yenki (Yantse)	Kirin	42°55′N	129°30′E	551	1914-1928
Yentai	Liaoning	41°16′N	123°10′E	——	1934-1935
Yinkow (Newchwang)	Liaoning	40°40′N	122°14′E	12	1906-1934
CHINA					
Peiping	Hopeh	39°55′N	116°24′E	141	1841-1936
Tientsin	Hopeh	39°09′N	117°09′E	16	1891-1934
CHOSEN					
Ryuganpo		39°56′N	124°22′E	20	1905-1929
Shingishu		39°56′N	124°30′E	——	——
Sosan		40°56′N	125°48′E	500	1919-1922
Tyukotin		41°50′N	126°53′E	1030	1915-1929
Yuki		42°20′N	130°24′E	213	1915-1929
U. S. S. R.					
Blagoveschensk		50°16′N	127°31′E	466	1877-1930
Khabarovsk		48°28′N	135°03′E	164	22 yrs.
Pokrovka		53°21′N	121°33′E	1038	1881-1919
Vladivostok		43°07′N	131°55′E	88	53 yrs.

A marked diurnal variation is evidenced in the amount of cloud (figure 6)* at most of the stations; the maximum occurs in the afternoon and the minimum at night. The following table shows the diurnal variation in frequency of clear skies (3/10 or less cloudiness) at Harbin, a representative interior station, and at Yinkow, a representative maritime station. (Table A, page 80.)

It can be seen that at Yinkow, which is representative of the coastal stations, clear skies are less common in the morning (0600) than in the afternoon (1400); but at this station the greatest frequency of clear skies is in the evening (2200) just as it is in the interior.

The variation in mean sky cover from year to year is considerable, as the following table for greatest and least monthly cloud amounts at Yinkow shows: (Table B, page 80.)

Nonperiodic variations in the interior are equally pronounced.

Ceilings: Data on the occurrence of ceilings are not available for any station in Manchuria. The large percentage of clear skies during most of the year indicates that there will generally be sufficient ceiling for successful air operations. The following exceptions should be noted:

Low ceilings occur during thunderstorms (figure 10; table 10)† for short periods but will usually hinder operations only during the afternoon in these latitudes. Frontal thunderstorms may occur at any time of the day or night but such storms are common only in spring.

The fact that at Yinkow, Port Arthur, Dairen and Antung, the highest frequency of cloudiness is in the morning rather than in the middle of the day, indicates that a great deal of stratus cloud occurs in the early morning hours.

It is to be expected that cloudiness will be greater and ceilings lower on the windward side of the several mountain ranges, especially when the winds are coming from maritime regions—i. e., during the summer monsoon. Conversely, cloudiness, as a rule, will be less and ceilings higher, or unlimited, on the lee side of the same ranges.

*Figure 6, page 80.
†Figure 10, page 84; Table 10, page 92.

Data on the frequency of low clouds indicate that in winter clouds below 10,000 feet occur on less than 5 days a month on the average, and on from 1 to 10 days a month, depending on whether the year is subnormally or abnormally cloudy. Low clouds occur more frequently along the coast than in the interior and more often in the morning than in the afternoon or evening.

In the summer half of the year low cloudiness is more common on the whole than in winter and most frequent in the afternoon. This is not true along the coast of the Liaotung Peninsula, where little seasonal variation in the amount of low clouds occurs. During a normal summer, low clouds will be found on over half of the days in each month and it is not uncommon to find 25 days a month with ceilings under 10,000 feet. The proportion of these clouds which are below 1000 feet, is smaller, however, in summer than in winter.

VISIBILITY

Visibility is limited by precipitation at times in summer and by falling or drifting snow occasionally in winter. It is affected more often by radiation fog, dust and haze, all of which occur most frequently in late winter and spring.

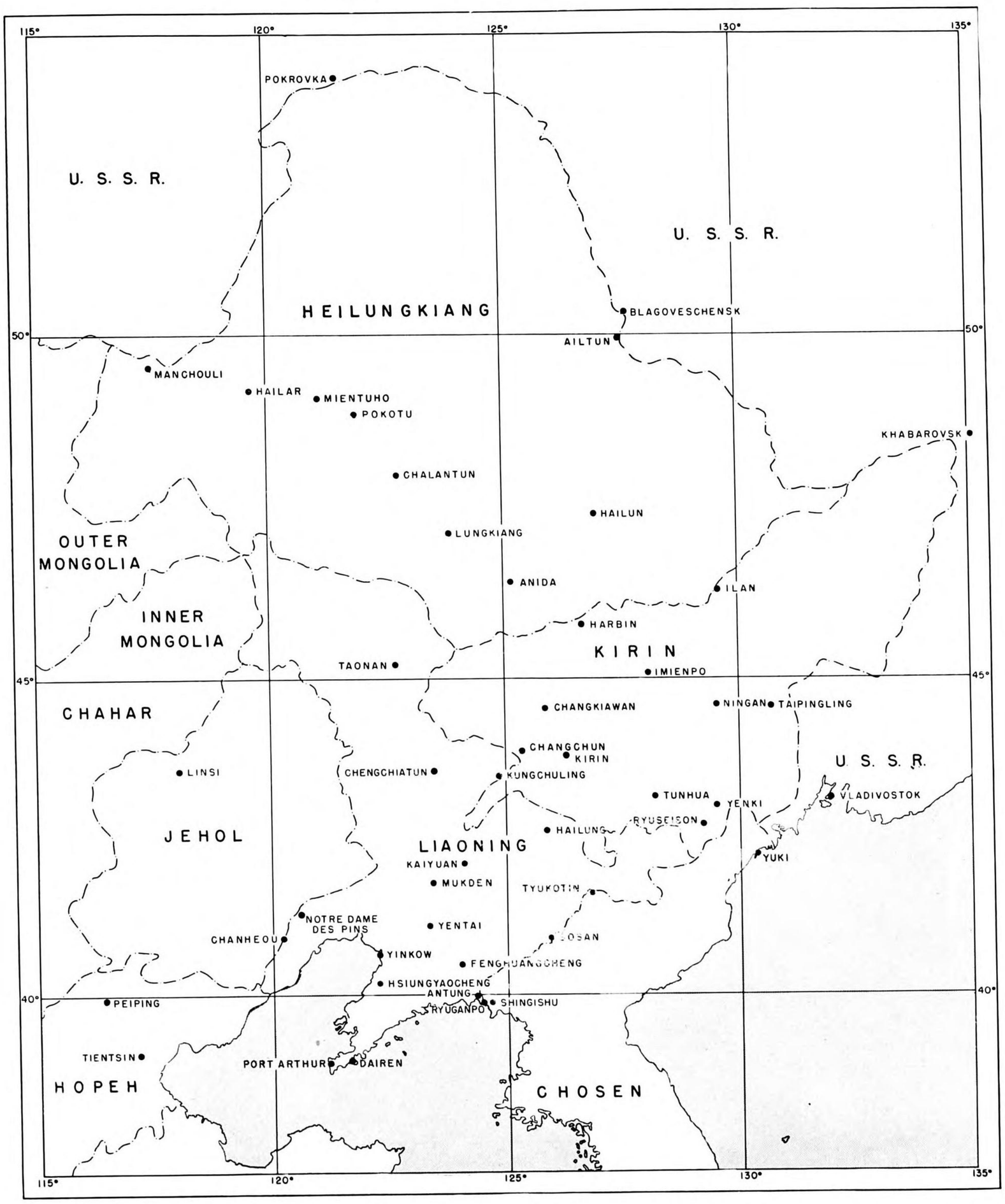
Fog: The frequency of fog in Manchuria is quite low compared with many contiguous areas (figure 7; table 5).* Winter radiation fogs are the most common type in the northern and western portions and are observed most frequently in valleys where the drainage is poor. The foggiest region in winter is on the northwest side of the Great Khingan Shan (Hailar and Mientuho), where a total of 15 or more days with fog occurs during December, January and February. This high frequency of winter radiation fog is characteristic of the valleys throughout the Lake Baikal region. Fog is most likely to occur during periods of falling or of extremely low temperatures. Hence, most of the fogs are very shallow and composed of ice crystals. Such fogs are usually absent wherever a slight slope provides drainage and are most common in the vicinity of cities where smoke and water vapor are added artificially to the otherwise very dry atmosphere. Even in the vicinity of small settlements an increase in the frequency of ice-fog will be noted.

*Figure 7, page 81; Table 5, page 90.

3650 2000—74 -Manchuria—7-11-44—First Proof

WEATHER INFORMATION, MANCHURIA—Continued

Figure 1.—Station Location Map



In eastern, southeastern and southern Manchuria, the higher frequency of maritime air masses in summer and the more vigorous wind circulation in winter result in a reversal of the fog regime found in the north and west. Even these summer fogs, however, are mostly of the radiation type and occur at night and in the early morning when warm, moist air becomes trapped in the interior valleys. Along the coast (Liaotung Peninsula) true maritime or advection fog sometimes occurs in spring or early summer. At Dairen and Port Arthur fog is reported on an average 7 or 8 days during July, 4 or 5 days in May and June but only 1 or 2 days in August, and less than 1 day a month in September, October and November. At Dairen, where the average 0600 fog frequency during July was 4.0, the actual occurrence on 2 successive years was one and 7 days respectively. The diurnal variation in fog is shown by the following table: (Table C, page 81.)

Dust and Haze: Visibility is limited as often in Manchuria by dust and haze as by fog. Whereas fog occurs most frequently in early morning, when the air is calm and stratified, dust is most frequent in the afternoon, when wind and turbulence are the most active. It is more common in late winter and spring than in summer and fall, since lapse rates are steeper and the air and ground are drier during the latter part of the winter monsoon than during the warm summer monsoon season.

Local duststorms occur almost daily during March, April and May in the dry plains of Manchuria. These duststorms interfere with air operations for only a short time each day and over limited areas. More serious are the general duststorms produced by large-scale transportation of dust, raised in a similar manner over the plains of Mongolia, the Gobi or Ordos Desert. These duststorms which sometimes may even be carried across the Sea of Japan, or the China Sea to the Japanese Islands, contaminate the air to great heights (10,000-15,000 feet) and the visibility is reduced to from 1 to 6 miles over thousands of square miles. Whereas the local duststorms have a distinct diurnal maximum in mid-afternoon and may occur in any type of air mass, the general duststorms occur more in connection with cold frontal passages and thus may come at any time of the day. However, frontal duststorms are somewhat more common in the middle of the day than at night, because the imported dust is supplemented by a large amount of local dust as the dry fronts pass over arid and snow-free surface during the heat of the day—the time of greatest convective activity.

Thick dust, that is, dust which reduces visibility to less than one mile, occurs on 2 or 3 days a month, during the first half of the year, with the maximum frequency in April or May. Haze is reported on one or more days a month in the spring and is probably composed mostly of dust which is too dispersed to be recognized as such. This haze extends up to the higher flying levels and is more frequent in the south of Manchuria, than in the north.

PRECIPITATION AND THUNDERSTORMS

Precipitation: Total annual precipitation over this area averages from 10 inches at Manchouli in northwestern Heilungkiang to 40 inches at Antung on the border of Chosen (figure 8; table 6).* In the southeastern part of Manchuria, averages over 20 inches a year are found in most places, while in the western desert regions the average ranges from 10 to 15 inches.

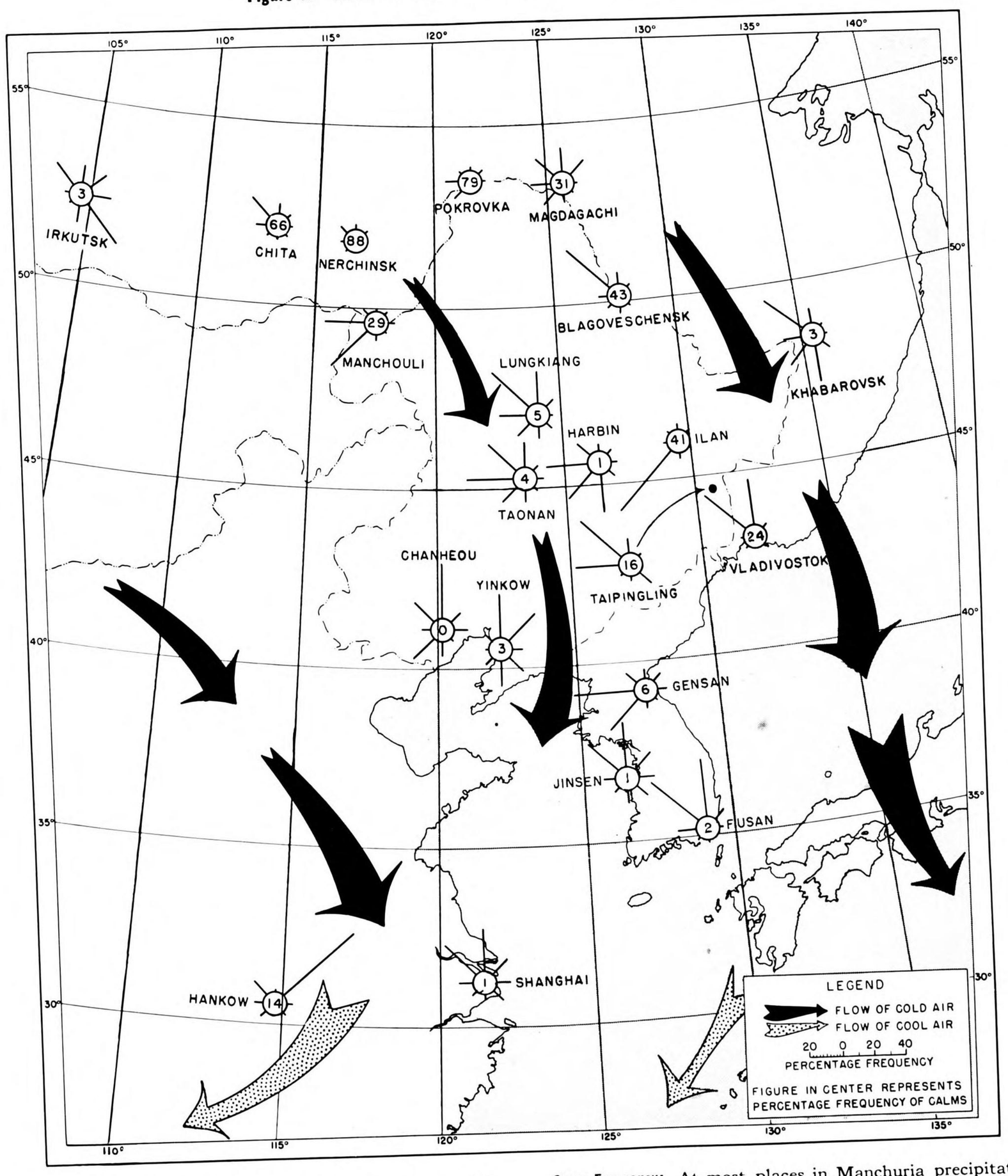
Summer is the wettest season in all parts of Manchuria, 55 to 75 percent of the average annual total occurring in the months of June, July and August. The southern and southeastern portions show the smallest proportion of the annual total in summer (Dairen, 55 percent) and the extreme western and northern stations the greatest proportion (Notre Dame des Pins, 74 percent). The highest monthly average is recorded at Antung, (10.57 inches in July) and the lowest values for the summer season are found in the Barga region west of the Great Khingan Mountains (Manchouli, 2.88 inches in July).

*Figure 8, page 82; Table 6, page 91.

By [illegible] NARA, Date [illegible]

WEATHER INFORMATION, MANCHURIA—Continued

Figure 2.—Mean Air Flow and Surface Wind Roses—January



Winter, on the other hand, is the season when almost no precipitation occurs in Manchuria. Even the more humid sections receive a total of little more than one inch for the 3 months of December, January and February, and in the desert regions of Jehol and western Heilungkiang, the average for the 3 winter months is less than one-fourth inch. In fact, many winters go by without even a trace of precipitation. Table D, page 82 shows the extremes of recorded precipitation at a few representative stations. It can be seen that even in the humid regions, such as Dairen where excessive amounts of precipitation may occur in summer, the summers may be very dry, and in winter, months may go by without a trace of moisture. It is interesting to note the intensity of the precipitation at several stations in Manchuria as indicated by the following table: (Table E, page 83.) The above figures indicate that it would be unusual for a heavy fall of snow to occur during the winter months, and that flood-producing rainfall might occur during July, August or September in the southern or eastern part of the region. The heaviest amounts in the Great Plains region occur in connection with thunderstorms, whereas in the maritime regions several inches can occur in one day at a time when a typhoon is over or near the area.

*Figure 9 and table 7 which give the number of days with precipitation, shows that rain may fall on half of the days each month in summer and on only 3 to 8 days a month in winter at most places. The greatest number of rainy days occurs in Kirin, rather than in the Yellow Sea region. In the latter section the intensity of precipitation is greater than in the former and results in a greater annual total even though rain occurs on a fewer number of days. The least number of rainy days occurs in Jehol where an average of only 1 or 2 days a month with precipitation in winter is recorded.

*Figure 9, page 83; Table 7, page 91.

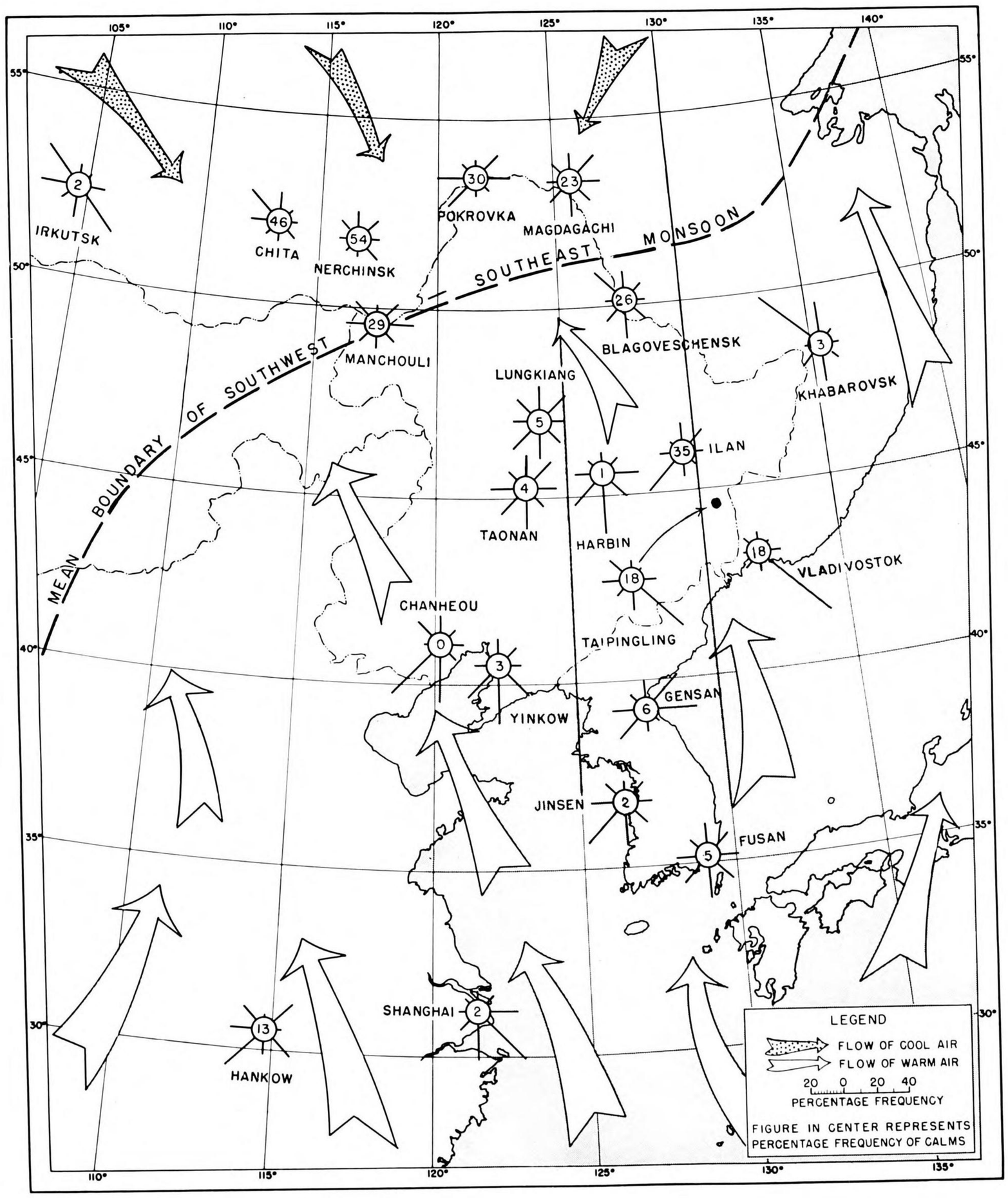
Snow Frequency: At most places in Manchuria precipitation is recorded on the average of 3 times as many days in the period from May through October as in the 6 months from November through April, indicating that there are over 3 times as many days with rain in the summer half year as days with snow in the winter half of the year. Table 8,* which shows the average number of days with a trace or more of snow, bears this out. It can be seen that the annual number of days with snow varies from less than 20 in the extreme north or west, to 50 or over in the mountains of Kirin Province. Peiping, which lies just south of the mountains of Jehol, averages only 8 days a year with snow. Snow rarely occurs In Manchuria between May and the end of September. In October snowfall is experienced on from 1 to 5 days on the average. During the months from November through March snow can be expected on 3 or 4 days a month in Heilungkiang, on 5 to 10 days a month in Kirin and Liaoning, and on 1 to 4 days a month in Jehol and Hopeh. The greatest frequency is at mountain stations.

Snow Cover: Snowfall is not only infrequent in Manchuria but rarely accumulates to any great depth during the cold, dry winters. Table 9† gives the average number of days with snow cover in Heilungkiang and Kirin Provinces. Some snow remains on the ground at many of the stations most of the time from the middle of November to the last part of March. During October and April snow covers the ground only a few days during each year and from May through September snow cover is rare in the habitable regions. On the open plains snow cover will be less common than in the vicinity of settlements where the above-mentioned data were recorded, as snow tends to drift away from open fields and exposed slopes and to collect wherever trees, houses or rough

*Table 8, page 92.
†Table 9, page 92.

WEATHER INFORMATION, MANCHURIA—Continued

Figure 3.—Mean Air Flow and Surface Wind Roses—July



ground reduce the wind velocity. Moreover, in the exposed places snow evaporates more readily than it does in the protected and shaded towns because of the higher wind velocities and the greater amount of insolation.

The longest period with snow cover and incidentally the region of deepest snow cover occurs in eastern Kirin. Taipingling shows 158 days a year with snow cover and enough moisture during the sub-freezing period to produce an average of 2 or 3 feet of snow by spring. In the drier regions to the west and north of Harbin scarcely enough moisture falls throughout the winter to provide a foot of snow on the level even if no evaporation takes place during the long, dry winter. As mentioned above, during many winters large portions of Manchuria are bare of snow or only partially covered at best.

Thunderstorms: Table 10 and figure 10* show the frequency and distribution of thunderstorms in Manchuria. From 7 to 22 thunderstorms may be expected each year, with the greatest frequency in June, July and August, during which season 90 percent of all such storms occur. Almost no thunderstorms occur during the season of the winter monsoon (November through March). This fact indicates that the air is either too stable or too dry at that season for cumulonimbus formation. Frequency of duststorms in March and April leads to the assumption that it is the excessive dryness in early spring that prevents thunderstorm activity, whereas it is likely that from November through February it is the stability in the subsiding anticyclone that accounts for the low frequency of thunderstorms at that season. Data on cloud-type frequency bears this out.

The frequency of thunderstorms is associated closely with the topography as well as with the summer monsoon season. Since most of the moisture enters this region from the south or southeast, it would be expected that thunderstorms would be more common on the southeastern slopes of the various ranges and less common on the northwestern slopes. This proves to be the case. For example, on the slopes of the Great Khingan Shan, Mientuho on the northwest side averages 6.6 days a year with thunderstorms, while Chalantun on the southeast slope averages 22.0 days. In the extreme south and east, Notre Dame des Pins on a southeast slope averages 21.9 days a year, and Taipingling on the northwest slope of the opposite range averages only 9 days a year with thunderstorms.

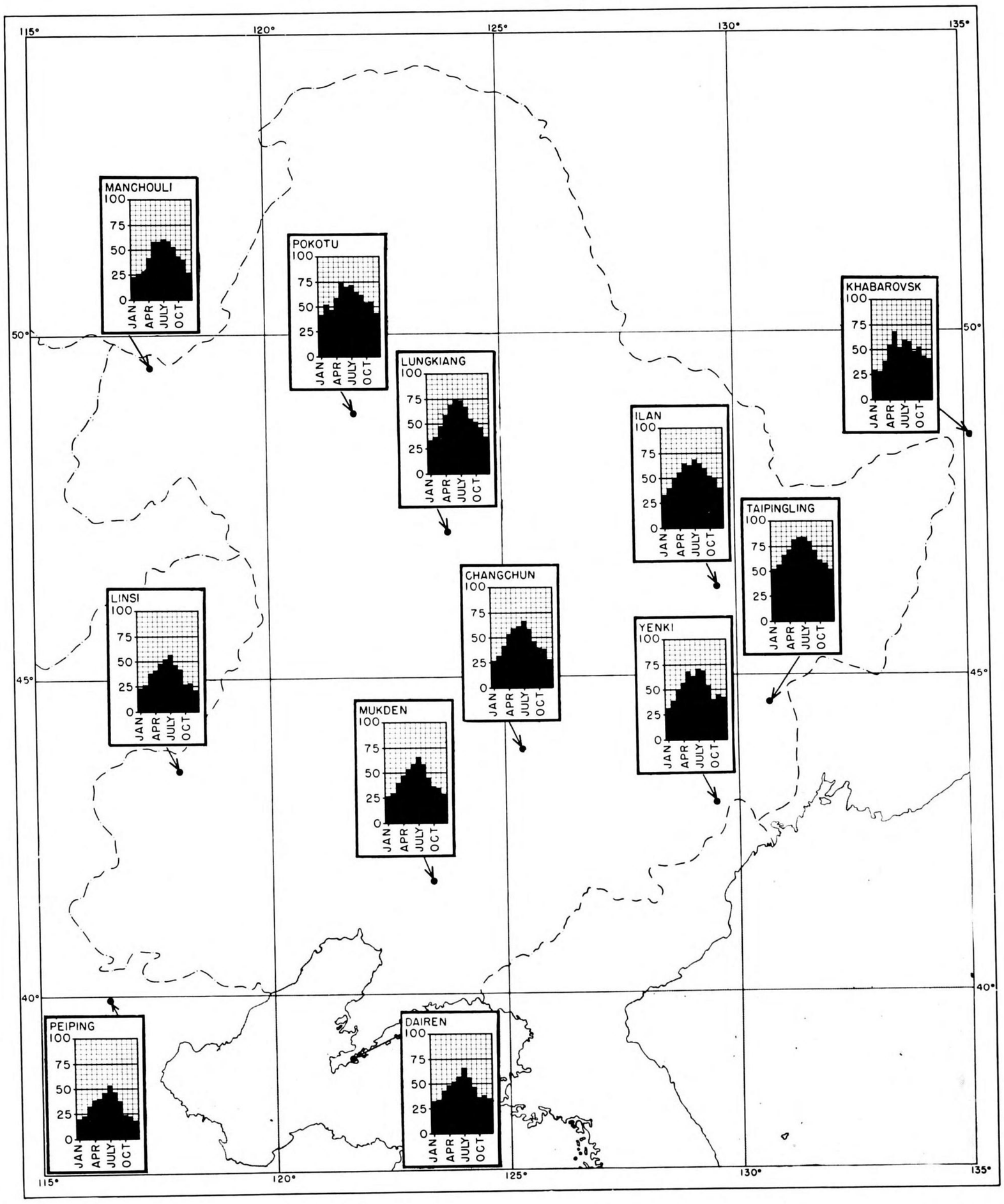
Just as the most frequent thunderstorms occur in June or July, the warmest months of the year, so the greatest diurnal frequency of thunderstorms is in the early afternoon, the time of greatest surface heating and convective activity. In this northern continental region, thunderstorms rapidly dissipate around sunset and rarely form before 1000 local standard time.

The number of thunderstorms in any month varies greatly from year to year. For example, at a place like Changchun (Hsingking) in the Great Plain where the average frequency during June or July is about 6 a month, the actual number of thunderstorms in any given June or July may vary from 0 to 15.

*Table 10, page 92; Figure 10, page 84.

WEATHER INFORMATION, MANCHURIA—Continued

Figure 4.—Average Monthly Cloudiness Per Cent



Hail: Hail, which usually occurs in connection with thunderstorms, is fairly common in the interior of Manchuria, though rare elsewhere in this region. In the Great Plains and the slopes of the Great Khingan Shan, hail is reported on an average 2 to 4 days a year; elsewhere it is reported on less than 2 days a year. The frequency of hail at a few stations in Manchuria is as follows:

Distribution of Hail

Station	Winter	Spring	Summer	Fall	Annual	Yrs. rec.
Mientuho	0.0	0.6	1.5	1.4	3.5	7
Pokotu	0.0	0.9	2.1	0.4	3.4	7
Chalantun	0.0	0.4	1.5	0.3	2.2	7
Changkiawan	0.0	1.0	1.0	0.2	2.2	7
Taipingling	0.0	0.3	1.4	0.4	2.1	7
Changchun	0.0	1.4	1.5	1.2	4.1	10
Dairen	0.0	0.3	0.0	1.0	1.3	10

There are reports of hailstones of considerable size piling up to a depth of several inches in the northern part of the central plain region. These storms which could damage planes severely, fortunately are limited in extent and duration, and can be easily seen and circumnavigated.

SURFACE AND UPPER AIR WINDS

Surface Winds: The direction of the wind (figures 2 and 3; tables 11, 12, and 13)* is governed mainly by the semi-permanent anticyclones, but due to the variety of topography, gradient flow is experienced at the surface only at a few stations (Pokotu, Lungkiang, Ailtun, and Khabarovsk). At the majority of the stations the winds are so light throughout the year, especially in the winter months, that the prevailing directions are influenced more by local drainage. For instance, at Ilan and Harbin in the Sungari Valley, the wind prevails throughout the year from the south, southwest or west, in spite of the general tendency for winds to be from the northwest during the winter throughout east Asia.

Table 12 shows that the percentage of calms in winter is very high. In many places in northern Manchuria and the Amur Valley calms occur 70 or 80 percent of the time in January. In summer (table 13) calms occur about one-third of the time, except at the places where air drainage is the best and along the coast of Liaoning Peninsula. In the latter region calms are also rare in winter, since the Northwest Monsoon increases in strength and persistence as the Sea is approached.

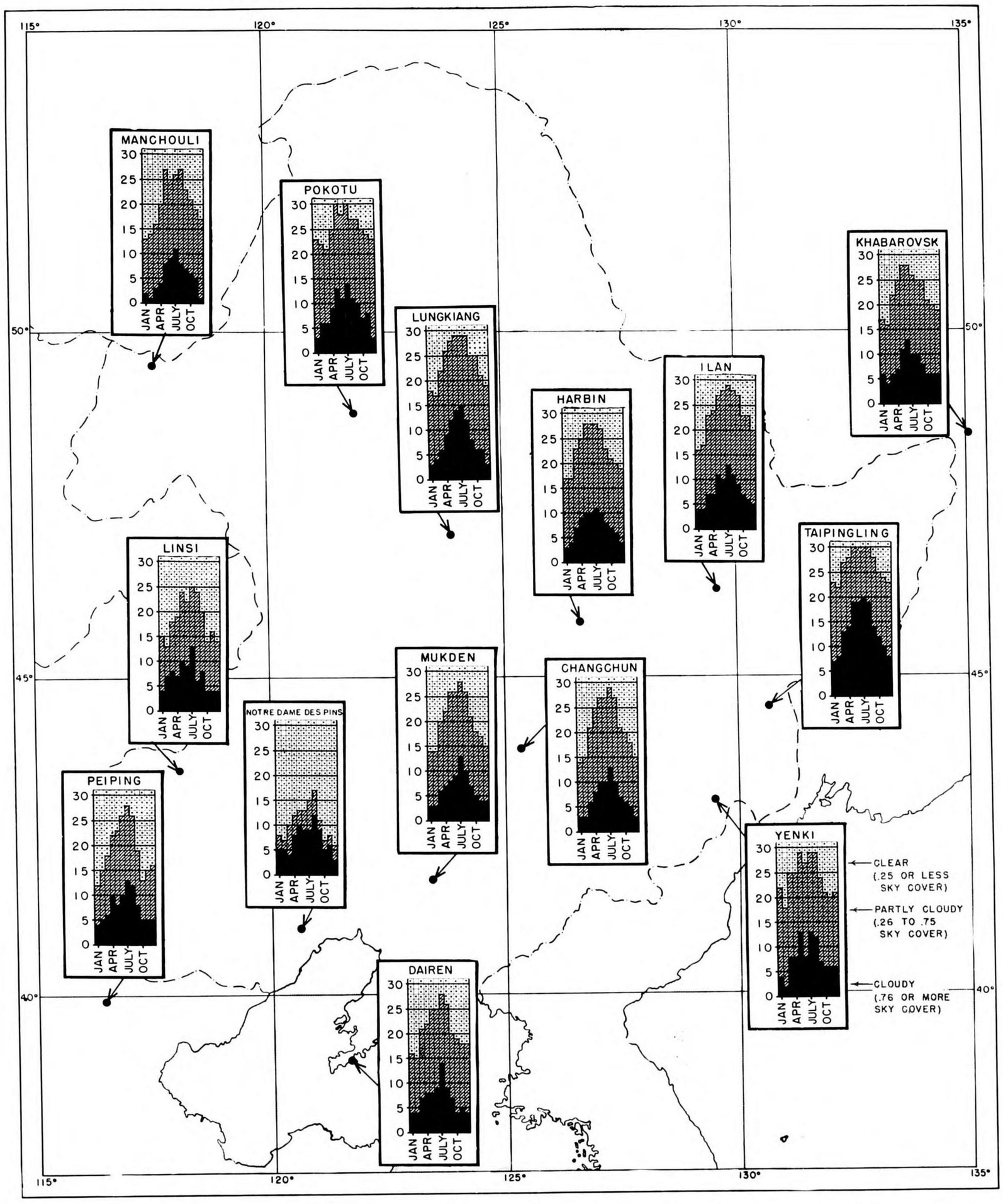
It should be noted (tables 12 and 13) that secondary directions are sometimes almost as prevalent as the prevailing direction in any month. For instance, at Harbin in January, the wind prevails 24 percent of the time from the south, 22 percent of the time from the southwest, and 26 percent of the time from the west. At Taonan in northern Liaoning Province the winds in July prevail from south, southwest, west, north, northeast and east with almost equal frequency.

Table 13 gives the average hourly velocity for each month at a number of stations in this area. The highest average velocities occur at Lungkiang, Harbin, Yinkow, Notre Dame des Pins and Dairen, all places where orographic effects are pronounced. The months in which strongest winds occur are March or April at most stations.

*Figure 2, page 76; Figure 3, page 77; Tables 11 and 12, page 93; Table 13, page 94.

WEATHER INFORMATION, MANCHURIA—Continued

Figure 5.—Average Number of Cloudy, Partly Cloudy and Clear Days!



Even at stations where calms are highly prevalent in winter, average wind speeds in spring are nearly as high as those at the above mentioned windier places which seldom record calms even in midwinter. So it may be safe to generalize that constant winds of moderate force blow everywhere in Manchuria in spring and in some places throughout the year.

*Figure 11 shows the diurnal variation in wind speed. It is evident that the time of highest average wind speed is the early afternoon. The actual values for Harbin, one of the windiest places in Manchuria, are given below for the 3 standard observations. The 1300 average of 19 m.p.h. for April is equal to that recorded in the windiest of habitable continental localities. It should be noted that wind speeds are high during the fall as well as the spring. (Table F, page 84.)

Gales: In Japanese held territory, a gale is generally defined as a wind of 34 m.p.h. or over. At some stations in Kwantung and Jehol Provinces, however, it is evident that the number of gales is far too high to be consistent with data on the highest wind velocities in the various months. It is possible that these stations use the old definition of a gale as a wind of 22 m.p.h. or more. Table 13,† which shows the mean number of days with gales, gives a fairly good idea of their seasonal distribution even though the value of the data is impaired by the above mentioned uncertainty.

It is obvious that gales are infrequent in midwinter and midsummer in all locations, except the coastal areas and mountain passes. The highest frequency of gales is in spring in most places but in summer they occur in a few localities, especially in the south central portion. The summer gales are in many instances in connection with tropical cyclones or typhoons which during July, August and the first part of September invade the Yellow Sea, Liaotung Peninsula and at times cross into the Manchurian Plains or the eastern mountains. Such typhoons are accompanied by winds of 50 to 70 m.p.h., and by torrential rains. At the most, 2 or 3 typhoons a year affect southern Manchuria. Many seasons go by without any typhoons reaching the Yellow Sea.

Over the open plains gales exceeding 34 m.p.h. are to be expected on 3 to 6 days a month in spring. These gales are thermally produced and are associated with dry thunderstorms or squall lines in advance of a cold front, and occur usually in the afternoon. Velocities over 50 m.p.h. occur only in gusts. The chief hazard arising from these continental gales is the dust associated with the squall. Although the squalls hit suddenly and sometimes with great force, they can be seen for miles as they approach a field over the open plains. From the air it is possible to anticipate hazardous surface winds by watching telltale streamers of dust which, if noted in the morning, are sure to increase in area and intensity during the heat of the day or with the passage of a surface or upper front.

The highest velocities recorded at Changchun give an indication of conditions to be expected over the open plains of Manchuria and data for Dairen are representative of conditions in the southern part or maritime region. The directions of the highest wind velocities on record are given to show that the strongest winds on the coast are gradient or monsoonal winds, while in the interior even the strongest winds are deflected considerably by topography and drainage effects. (Table G, page 84.)

*Figure 11, page 85.
†Table 13, page 94.

3654 M.I.D.—79—Manchuria—7-11-44—First Proof

WEATHER INFORMATION, MANCHURIA—Continued

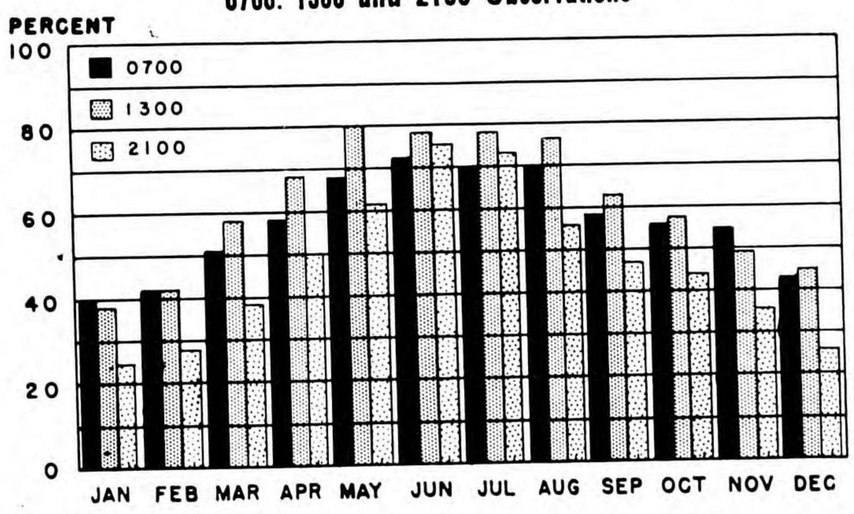
Table A.—Average Frequency of Clear Skies (Number of Occurrences)

Station	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Harbin												
0700 L.S.T.	19.6	18.1	16.5	10.8	10.3	9.0	10.5	10.5	15.0	16.2	16.6	19.7
1300	17.7	16.8	13.4	7.1	7.1	4.7	4.8	6.6	9.6	14.9	15.2	18.3
2100	24.5	22.0	19.7	15.1	12.7	10.6	13.1	16.0	17.8	18.6	21.3	22.8
Yinkow												
0600	24.0	18.5	18.0	13.6	12.1	10.4	8.5	10.6	14.5	19.0	19.5	23.7
1400	21.2	16.6	16.6	11.1	11.5	10.3	9.5	12.0	13.0	17.1	17.6	20.0
2200	23.8	20.0	20.5	17.6	16.6	13.8	14.4	17.5	18.4	20.7	21.4	23.6

Table B.—Maximum and Minimum Percentage of Mean Cloud Amount at Yinkow (24-year record)

	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Maximum	46	48	50	70	66	71	76	77	60	46	45	52
Minimum	10	15	26	30	40	44	42	40	30	18	19	15

Figure 6.—Average Monthly Cloudiness at Lungkiang 0700. 1300 and 2100 Observations



Upper Winds: Figures 12 and 13* show the directional frequency of winds of various speeds at various levels up to 19,700 feet (6 km.) for the 4 seasons at Shingishu, Chosen and the directional frequency and average speed of the wind at various levels up to 13,100 feet (4 km.) at Vladivostok. Since no upper air data have been summarized for Manchuria proper, the station at Shingishu which is across the border and just a few miles from Antung in Liaoning Province, is representative of the monsoonal type winds prevailing along the southern coastal areas of Manchuria. Vladivostok lies on the Sea of Japan just 50 miles from the eastern border of Kirin Province and should be representative of winds to be found over the eastern mountains.

The most prominent feature of these wind-aloft charts is the prevalence of northwesterly winds above the gradient level during the fall, winter and spring, and the tendency for the winds to increase in speed and to become more westerly with increasing altitude. Southerly winds are more common at lower levels during the spring, than they are in fall or winter, and in summer are frequent up to 4 km. Above that level winds become westerly even in summer.

If gradient winds are westerly, the wind speed will usually increase with height and the winds will remain westerly or northwesterly at all levels. Conversely, if the gradient wind is southerly or easterly, the wind is likely to back or veer with increasing height until it becomes westerly; this backing or veering is accompanied by a decrease in velocity to the base of the westerlies, above which the winds will again increase in speed.

The winds up to 10,000 feet over the plains of central or northern Manchuria will be somewhat different from those portrayed for coastal stations since calm, anticyclonic conditions prevail much of the time during the cold half of the year in the interior. Above 3 or 4 km., west or northwest winds of frequency and speeds similar to those at Vladivostok should prevail.

TEMPERATURE AND HUMIDITY

Surface Temperatures: Temperature data for selected stations in each of the principal regions are given in tables 16, 17, 18 and 19.† The coldest region is shown to be the plains of northwest Heilungkiang beyond the Great Khingan Shan. In the upper Amur and Argun Valleys, the average maximum temperatures are below zero during December and January and extreme minimum temperatures of 60 below have been recorded. Average winter temperatures increase steadily toward the south and by the time the Yellow Sea gulfs are reached, the average maximum temperature is about 30° F., and the average daily minimum temperature is between 15° and 20°. At Dairen, Port Arthur, Peiping and Tientsin, the thermometer has gone below zero only a few times during a long period of record, and then only during December, January and February.

The frequency of sub-zero weather is indicated by the following table: (Table H, page 87.)

The summer, on the other hand, is quite warm on the plains and in the coastal regions of Manchuria. For example, Lungkiang (Tsitsihar) has absolute maxima over 100° F. in June, July and August, and temperatures above 90° F. in May and September, The average maximum in the summer at that point is 81.4° F.. compared with 80.2° F. at Port Arthur in the south, and 76.6° F. at Manchouli in the far north. The extreme continentality of the Manchurian Plain is indicated by the absolute range of 152° at Lungkiang, compared with 99° at Dairen and Port Arthur.

Rapid changes occur in the brief spring and in fall. The average temperature in April is more than 20° higher than in March; and in November is over 20° colder than in October.

The frequency of temperatures of 86° F. (30° C.) or over at 1300 local standard time gives an indication of the duration of the summer heat.

Average Number of Occasions during each Month with Temperatures of 86° F. or Higher at 1300 (10-year record)

	April	May	June	July	Aug.	Sept.	Oct.
Harbin	0.0	0.7	3.6	6.3	3.6	0.0	0.0
Changchun	0.0	0.4	4.7	9.8	7.4	0.4	0.0
Mukden	0.0	0.9	7.6	16.0	12.1	0.8	0.1
Yinkow	0.0	0.1	1.5	9.3	10.5	0.1	0.0
Dairen	0.0	0.0	1.2	4.7	6.2	0.1	0.0

Sub-freezing Temperatures: The possibility of icing at the surface is roughly indicated by table 20 which gives frequency of temperatures 32° F. or lower. It can be seen that freezing occurs almost every day from mid-October through mid-April in the greater part of the region. Along the coast the period of low temperatures is from mid-December to about the first of March. In the coldest regions freezing occurs on from 200 to 240 days each year on the average, whereas in the warmer portions there may be only 50 to 100 days with freezing at night.

Frost is rare in May and September and freezing never occurs during June, July and August except in the region northwest of the Great Khingan Range. Of interest in this connection is the rapid diurnal heating during spring and fall, as indicated by the less frequent occurrence of sub-freezing temperatures at 1300, compared with 0700 and 2100. (Table J, page 87.)

Icing: Freezing temperatures will occur at the surface from October to mid-April, and below 10,000 feet throughout the entire year during cold-frontal passages. In the vicinity of Liaotung Peninsula the average icing level in summer may be as high as 12,000 feet, but in the far north the freezing isotherm is normally around 7500 feet in mid-summer. Thus, icing may be encountered in thunderclouds in summer and during spring cold-frontal squalls. Icing danger is the greatest in the maritime regions where winter temperatures average slightly below freezing.

Humidity: The average daily relative humidity for each month at several stations in Manchuria is shown in table 21.* This brings out the fact that humidities are very high in summer, especially in the coastal regions. For instance, the mean relative humidity in July is 87 percent at Port Arthur, 89 percent at Vladivostok, but only 72 percent at Lungkiang and at Taonan in the interior. The lowest relative humidities are recorded in spring, the season of duststorms. In April Lungkiang has an average of 44 percent and Peiping 48 percent. At Port Arthur April is also the month of lowest average relative humidity but due to the maritime location the average for that month is 59 percent. Other stations in the region range between the two limits mentioned above.

Humidity is subject to large variations from day to day and from hour to hour; hence, mean values give little idea of the humidities which are likely to be experienced at any given time. Along the coast the relative humidity may reach 100 percent at any time, while on the other hand, it may fall below 20 percent and sometimes even below 10 percent in the spring. The following table gives the minimum relative humidity ever recorded in each month at a few stations. (Table K, page 87.)

The diurnal variation in relative humidity is illustrated by the following data for Peiping, which has an annual range similar to that in the interior plains of Manchuria: (Table L, page 87.)

This shows the high values prevailing in summer in the early morning hours and the low values prevailing during the winter monsoon season in the heat of the day.

OPERATIONAL WEATHER

Forecasting Problems: The chief problem in forecasting operational weather in Manchuria is that of forecasting the strengthening or weakening of the polar anticyclone which lies over or near Man-

*Figure 12, page 85; Figure 13, page 86.
†Table 16, page 95; Tables 17 and 18, page 96; Table 19, page 97.

*Table 21, page 98.

3654 80—Manchuria 7-11-44—First Proof

WEATHER INFORMATION, MANCHURIA—Continued

Figure 7.—Average Number of Days with Fog

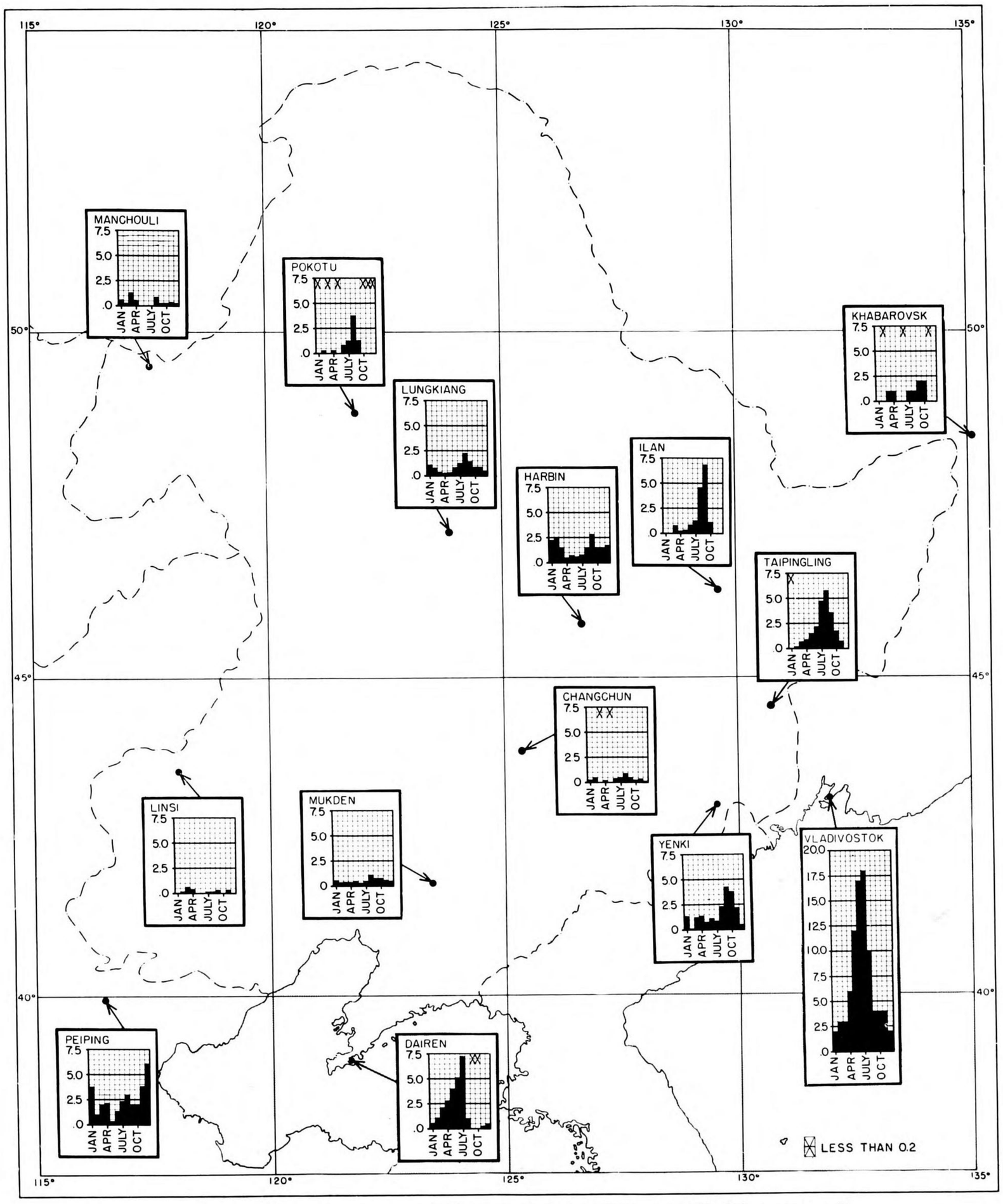


Table C.—Average Number of Occurrences of Fog at 0600 and 1800 (10-year record)

Station	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Dairen												
0600 L.S.T.	0.1	0.2	0.7	1.3	2.2	2.6	4.0	0.4	0.0	0.0	0.1	0.2
1800	0.2	0.1	0.4	0.6	0.5	1.0	0.9	0.0	0.0	0.0	0.1	0.0
Mukden												
0600	0.1	0.1	0.2	0.3	0.6	1.0	0.7	1.5	0.4	0.3	0.3	0.3
1800	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.1	0.1	0.1

churia in winter and backs to the west and north of Manchuria in summer. Only during the spring and the fall can forecasts based on the movement of cyclonic storms be made. Circulation, air mass movements and even storm tracks follow more of a meridional than a zonal trajectory. Furthermore, the central part of east Asia is a region of cyclogenesis and the interior sub-arctic regions of China and Siberia are regions of anticyclogenesis, thus presenting problems peculiar to the region. Very few studies have been made on forecasting in Manchuria as data, especially for the upper air, have been scanty. The Nanking Observatory has published studies based on a few upper air soundings made at Peiping (see bibliography). These studies could be applied to the southern part of Manchuria.

Sample weather maps for winter and summer are given in figures 14 and 15, respectively.* The map for January 10, 1933 illustrates the strengthening of the winter monsoon accompanied by a low pressure area centered between China and Japan. This shows also a common feature of the winter circulation, namely a pressure center of 1060 mb. over the upper Amur Valley. This type produces unsettled weather followed by clearing in the coastal target areas. Pronounced temperature inversions, shallow ground fog, extremely low surface temperatures, generally stable air and light winds will be found over the interior in such situations.

Figure 15 for July 9, 1937, representing a summer type, illustrates a semi-permanent feature of the weather map of east Asia at that season, namely, a thermal *low* centered in China. High temperatures are general except where local cooling occurs in widely scattered thundershowers or at high elevations.

Best Season for Air Operations: Taking into consideration the climatic data presented herewith; the difficulties of forecasting certain types of weather in view of the limited amount of upper air data and even of surface data to the west of Manchuria; and finally using summaries of operational days for high-and-low level bombing prepared from a series of 5 years synoptic weather maps for specific targets in Manchuria, it appears that winter (October through March) is the best season for bombing operations over this region.

The winter air masses over Manchuria are dry and cold, the air is clear and stable and upper air winds are steadier and not so turbulent as in summer. The summer air masses, coming from the humid tropical Pacific, give rise to much cloudiness, frequent and sometimes heavy rains, occasional typhoons, fog along the coasts and icing in the clouds at high altitudes. Thunderstorms are common in the interior and hail may sometimes be encountered over the open plains. In spring the chief limitation is dust and haze which accompanies the passage of cold fronts over the dry southwestern plains and hills and spreads to other regions.

The following table shows the average number of days suitable for high or low level bombing at 0600 and 1800, based solely on terminal conditions, that is, not considering conditions which might be encountered en route: The data are computed from a 5-year record and represents the number of days with 0 to 3/10 cloud cover, without precipitation or obstructions to vision and without frontal activity in the area. (Table M, page 88.)

*Figure 14, page 87; Figure 15, page 88.

3454 3630—81—Manchuria—7-11-44—First Proof

WEATHER INFORMATION, MANCHURIA—Continued

Figure 8.—Average Total Monthly Precipitation (Inches)

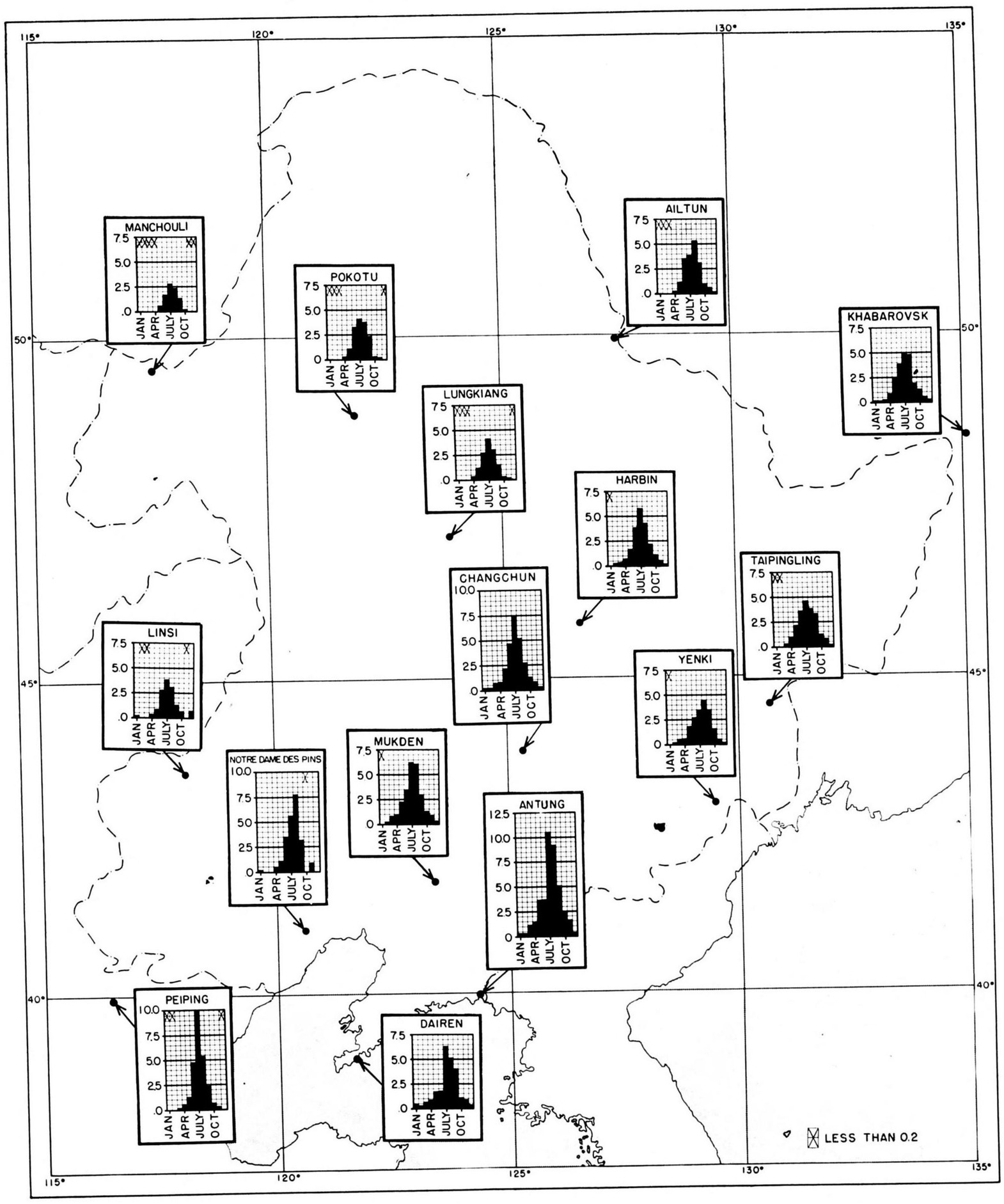


Table D.—Greatest and Least Monthly Precipitation in Inches

Station	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	No. yrs. rec.
Manchouli													20
Maximum	0.4	0.2	0.5	0.7	2.3	4.7	6.0	5.6	3.3	1.5	0.6	0.4	
Minimum	0.0	0.0	0.0	0.0	#	0.3	0.5	0.4	0.1	0.0	0.0	#	
Lungkiang													20
Maximum	0.2	0.6	0.4	1.1	3.6	7.9	8.4	6.8	3.8	1.7	0.6	0.4	
Minimum	0.0	0.0	#	0.0	#	0.4	1.3	0.7	0.5	0.0	0.0	0.0	
Harbin													20
Maximum	0.5	1.2	1.3	2.8	4.1	7.5	12.2	7.8	5.0	2.7	0.6	0.6	
Minimum	0.0	0.1	0.1	0.1	0.2	1.2	2.1	1.0	0.2	0.4	0.1	0.0	
Dairen													19
Maximum	1.9	1.1	3,5	2.6	4.3	3.3	16.0	15.3	12.7	2.3	2.7	0.9	
Minimum	0.0	0.0	0.0	0.0	0.1	0.4	0.3	0.6	0.1	0.4	0.1	0.0	

.05 inch or less.

365-K 2430—82—Marchant—7-11-44—First Proof

WEATHER INFORMATION, MANCHURIA—Continued

Figure 9.—Average Number of Days with Precipitation (.004 In. or More)

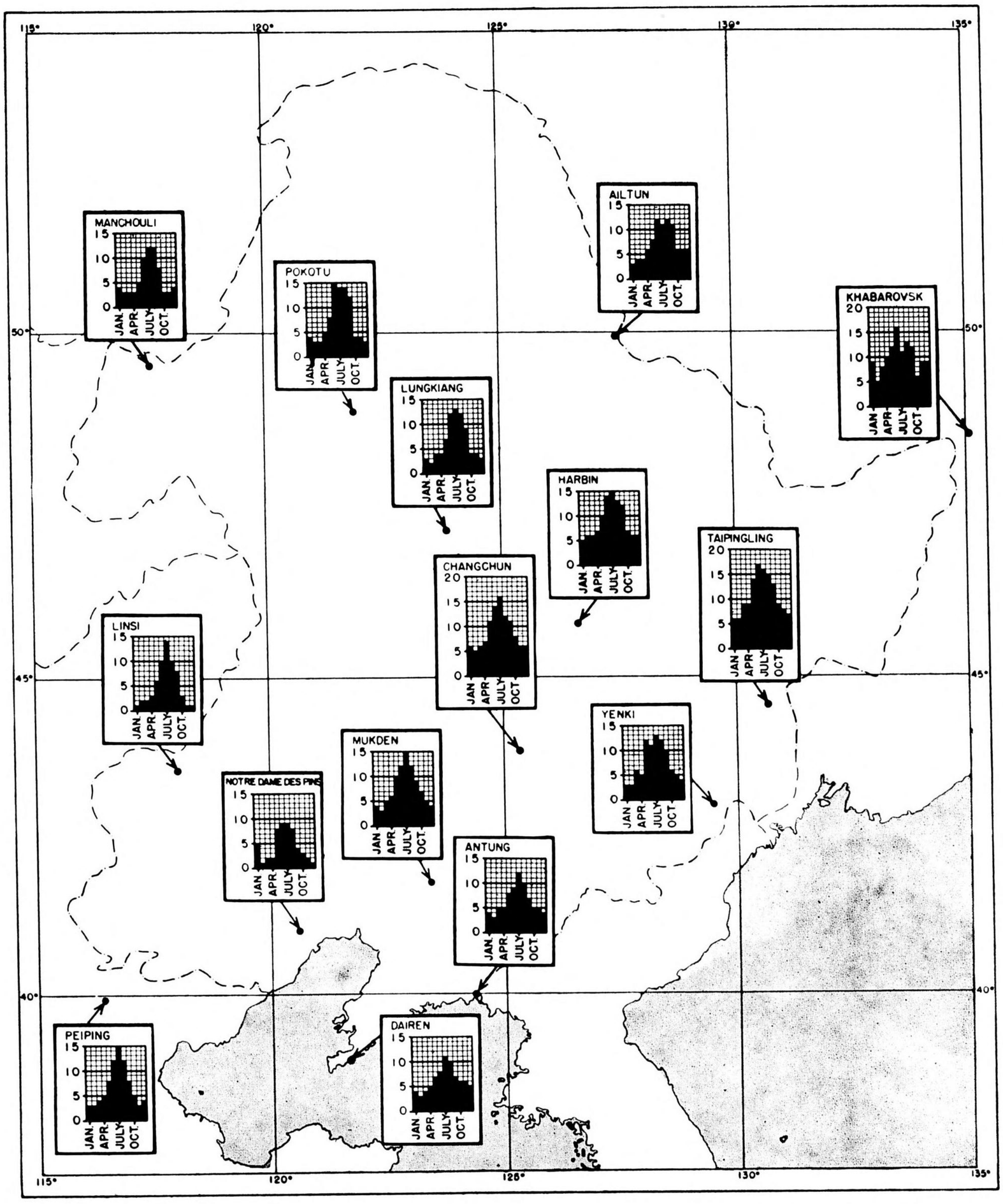


Table E.—Greatest Precipitation in Inches in 24 Hours

Station	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	No. yrs. rec.
Manchouli	0.1	0.1	0.3	0.4	1.3	1.9	1.1	2.3	1.4	1.0	0.5	0.2	7
Lungkiang	0.2	0.5	0.3	1.0	2.1	3.2	3.4	2.7	2.7	0.9	0.3	0.4	15
Harbin	0.2	0.3	0.5	0.9	1.2	2.5	5.8	3.7	2.1	1.1	0.6	0.2	15
Mukden	0.5	0.6	2.0	1.3	1.9	3.4	4.7	5.8	5.4	2.1	1.4	0.7	24
Dairen	1.4	1.2	1.8	1.9	2.2	2.7	7.5	6.4	4.1	1.5	1.8	0.6	25

3630—83—Manchuria—7-11-44—First Proof

WEATHER INFORMATION, MANCHURIA—Concluded

Figure 10.—Average Number of Days with Thunderstorms

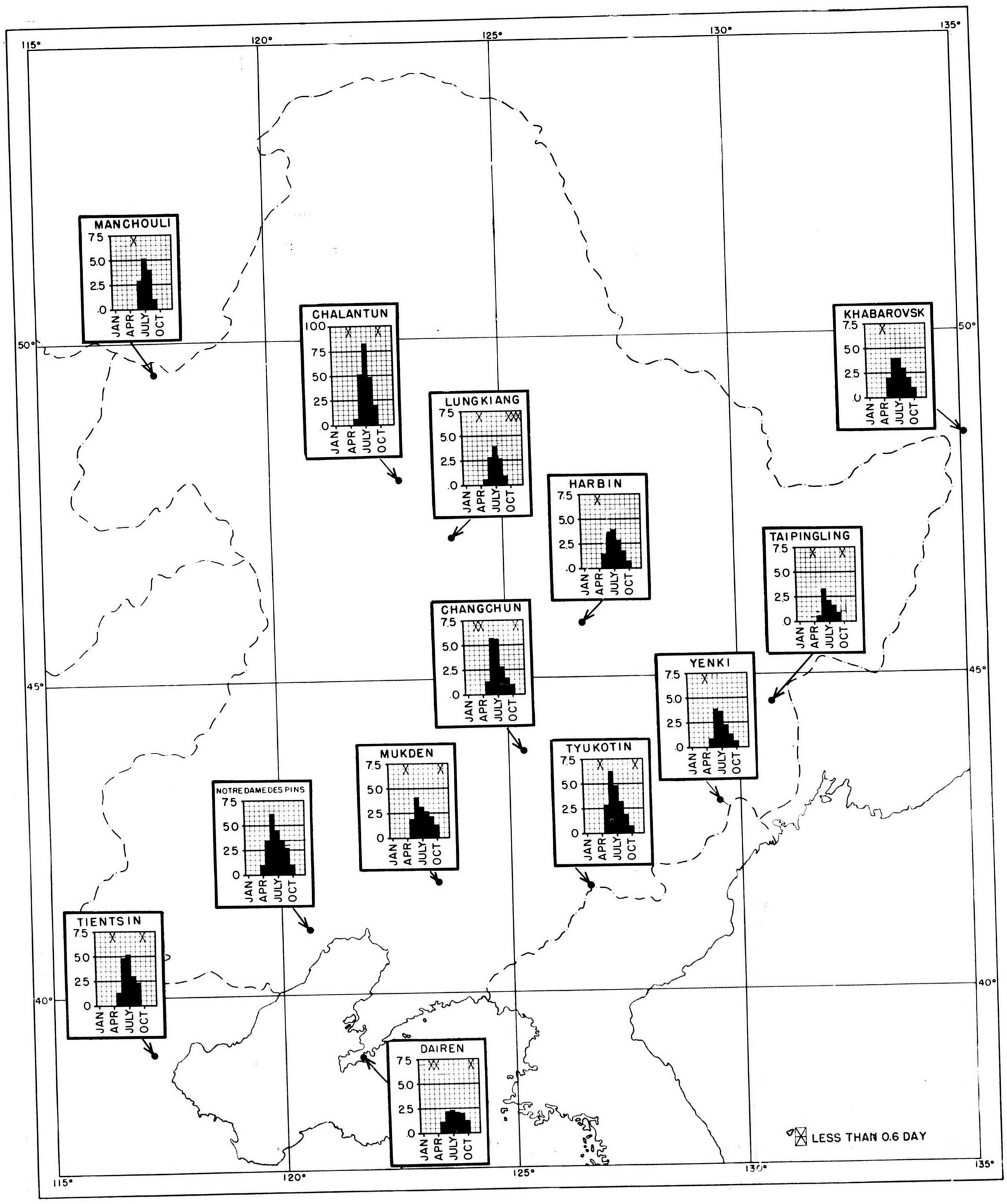


Table F.—Average Wind Speed (m.p.h.) at 0700, 1300, and 2100 for Harbin (15-year record)

L.S.T.	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Annual
0700	12	11	12	14	14	12	10	9	11	12	12	12	11.8
1300	13	13	16	19	17	14	13	12	14	16	15	13	14.5
2100	12	11	12	13	12	11	10	9	10	12	12	12	11.4

Table G.—Highest Wind Velocity in m.p.h. and Direction Thereof

Station	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	No. yrs. rec.
Changchun	45 W	44 WSW	59 SW	62 SW	63 SW	46 SW	37 SW	31 SW	41 SW	53 SW	54 SW	59 SW	21
Dairen	55 N	48 N	55 N	46 NW	48 SSW	39 WNW	42 SSW	44 S	39 NE	43 N	50 N	62 N	25

31574 3630—84—Manchuria—7-11-44—First Proof

WEATHER INFORMATION, MANCHURIA—Continued

Figure 12.—Seasonal Upper Winds—Vladivostok

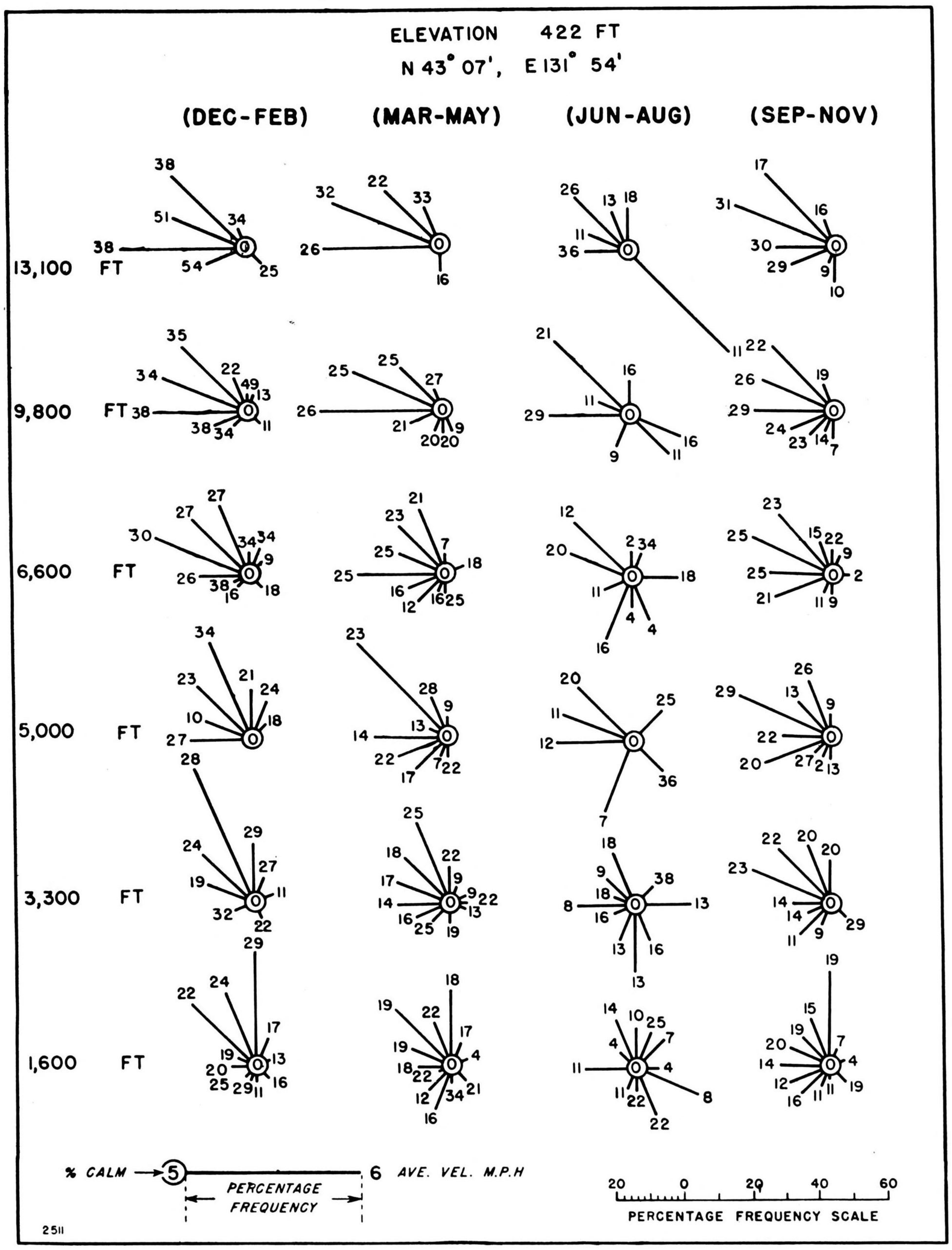
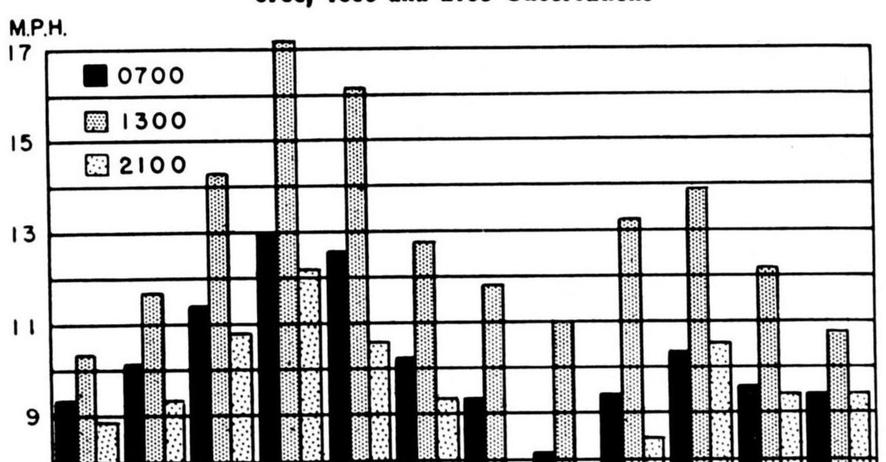


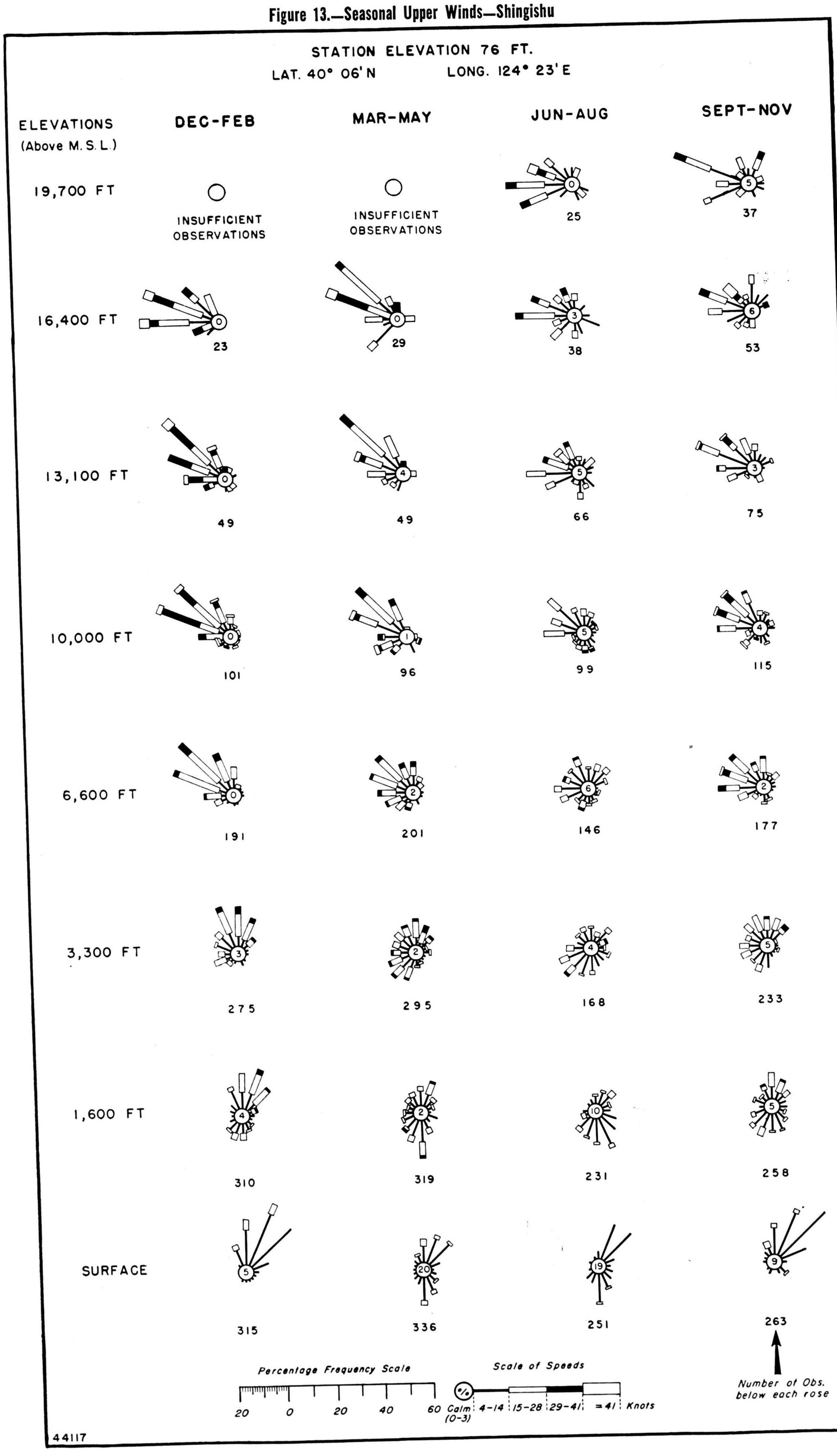
Figure 11.—Average Monthly Wind Speeds at Lungkiang
0700, 1300 and 2100 Observations



3654—85*—Manchuria—12-11-44—First Proof

WEATHER INFORMATION, MANCHURIA—Continued

Figure 13.—Seasonal Upper Winds—Shingishu



3634 —86— Manchuria — 7-11-44—First Proof

WEATHER INFORMATION, MANCHURIA—Continued

Table H.—Average Number of Occurrences of Temperatures −4° F. or Lower (−20° C.) at 0600 L.S.T. (10-year record)

Station	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Harbin	22.1	17.1	2.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.7	17.0
Changchun	18.0	11.1	1.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.9	12.7
Mukden	11.2	5.1	0.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	3.5
Yinkow	6.2	2.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.7
Dairen	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Table J.—Average Number of Occurrences of Temperatures Below 32° F. at Harbin

L.S.T.	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	April	May
0700	0.0	0.1	15.0	27.5	31.0	31.0	27.6	27.5	9.9	0.0
1300	0.0	0.0	2.0	17.8	29.2	30.8	26.1	14.0	0.7	0.0
2100	0.0	0.1	7.5	24.7	30.5	30.9	27.6	23.8	5.4	0.0

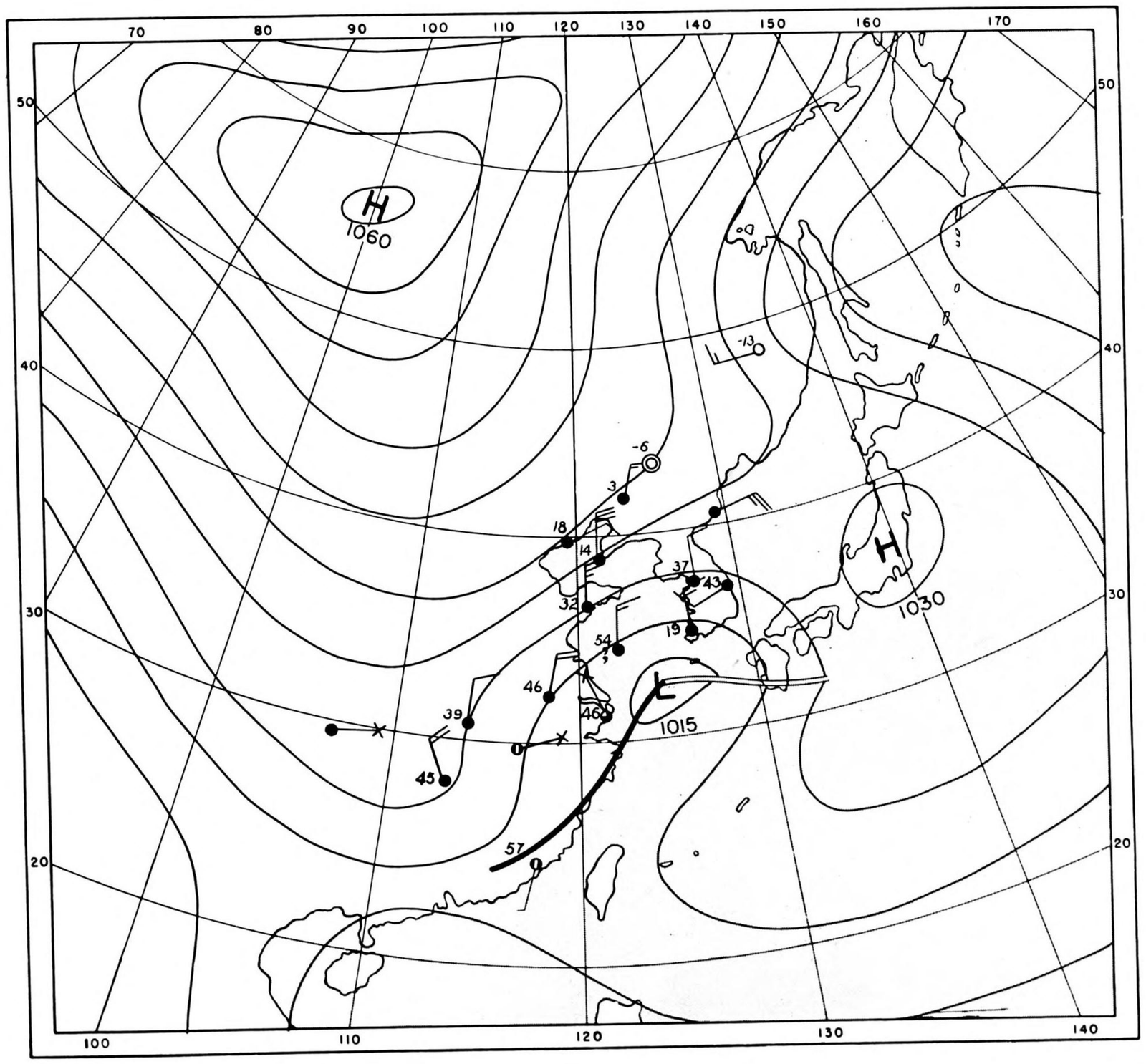
Table K.—Minimum Percentage Relative Humidity (26-year record)

Station	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Dairen	20	14	9	11	14	19	27	27	23	21	23	19
Mukden	5	7	8	4	12	13	17	27	19	17	7	2

Table L.—Diurnal Range in Average Percentage Relative Humidity at Peiping (5-year record)

L.S.T.	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
0600	54	55	56	57	65	79	88	91	86	74	65	57
1400	26	31	30	32	36	47	58	56	48	38	37	31

Figure 14.—Sample Winter Weather Map (Jan. 10, 1933)



30—87—Manchuria—7-11-44—First Proof

WEATHER INFORMATION, MANCHURIA—Continued

Figure 15.—Sample Summer Weather Map (July 9, 1937)

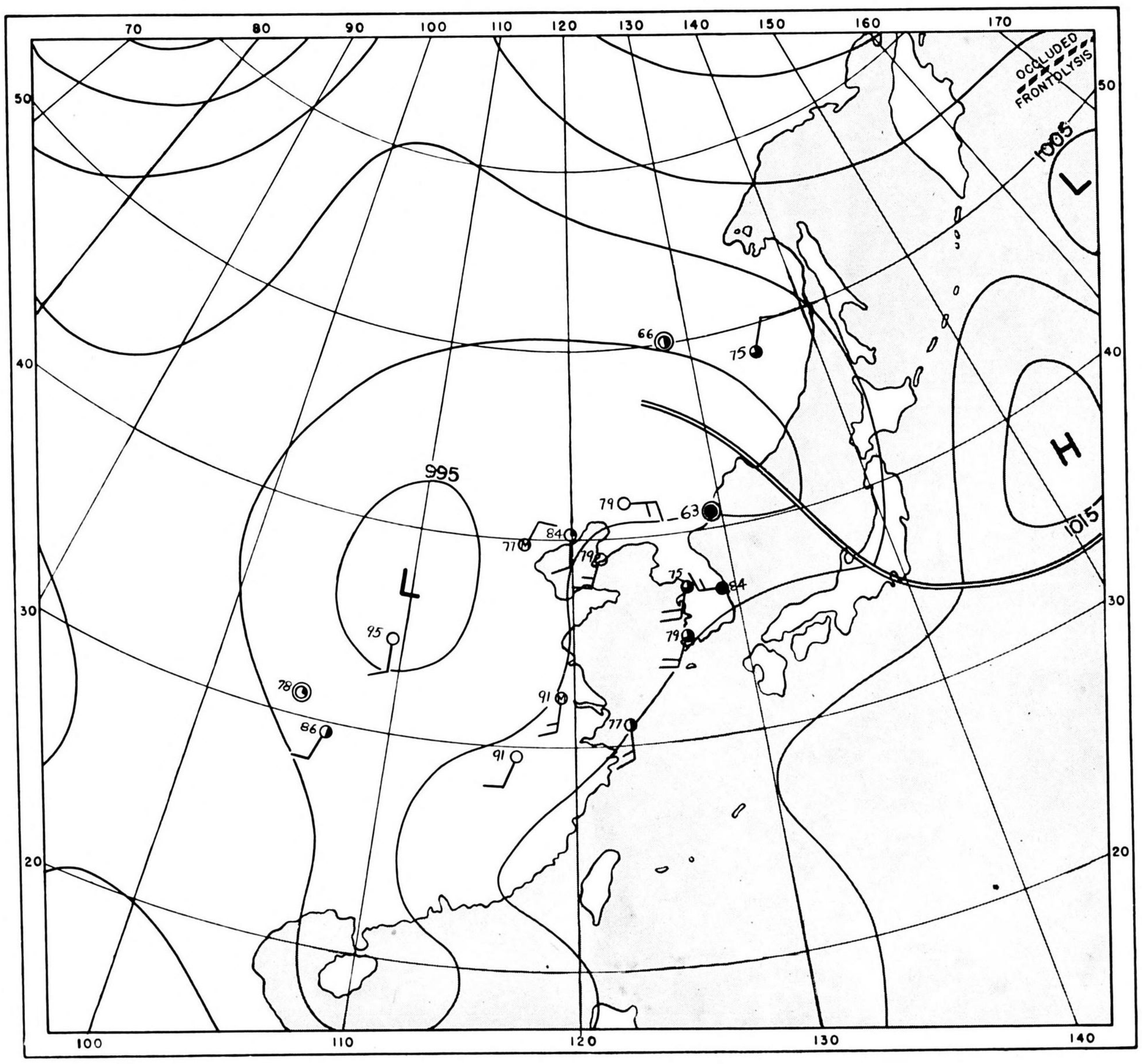


Table M.—Days Suitable for High- or Low-level Bombing

Station	L.S.T.	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Antung	0600	21	18	15	9	8	7	2	5	14	17	17	19
	1800	18	15	12	6	9	5	6	7	14	18	15	16
Dairen	0600	21	20	17	8	12	9	7	9	15	19	19	20
	1800	18	15	13	9	12	9	10	10	15	18	13	14
Changchun	0600	24	21	18	13	10	8	10	9	15	19	20	22
	1800	19	13	14	11	6	6	8	9	11	13	12	15
Mukden	0600	24	21	18	10	12	10	10	11	17	19	20	22
	1800	18	17	14	10	11	7	10	10	15	15	13	15
Yuki	0600	22	17	13	9	7	3	2	4	8	16	16	19
	1800	19	14	10	6	6	3	4	4	9	14	15	19
Peiping	0600	19	15	14	10	11	7	7	6	12	17	20	17
	1800						no	data					

3654 ~~3600~~—88—Manchuria—7-11-44—First Proof

WEATHER INFORMATION, MANCHURIA—Continued

Table 2.—Average Monthly Cloudiness in Percent*

	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Annual	No. yrs. rec.
HEILUNGKIANG														
Manchouli	24	26	29	42	58	58	61	58	53	44	40	27	43	7
Pokotu	42	52	47	59	75	70	72	65	62	54	55	54	58	7
Lungkiang	34	37	49	59	69	75	74	67	55	52	46	37	54	15
Anida	41	47	53	59	73	70	69	63	54	51	52	41	56	7
KIRIN														
Ilan	33	40	50	56	65	63	69	65	60	52	50	40	54	7
Harbin	33	39	48	57	65	64	65	61	52	46	45	37	51	15
Ningan	34	42	47	52	63	56	64	60	51	43	52	45	51	7
Taipingling	51	57	66	72	82	84	84	80	71	61	58	52	68	15
Changchun	26	32	42	54	59	61	67	59	46	39	38	28	46	21
Yenki	32	39	50	57	68	64	71	69	54	40	45	42	53	6
LIAONING														
Taonan†	21	26	31	45	54	56	62	57	45	32	28	19	40	5
Mukden	26	30	40	48	54	59	66	58	45	37	35	29	44	24
Yinkow†	26	30	40	49	52	57	62	55	43	33	32	28	42	29
KWANTUNG														
Dairen	33	34	43	49	52	56	66	56	46	36	38	35	45	25
Port Arthur	37	36	41	52	50	58	66	57	39	36	41	49	47	10
JEHOL														
Linsi	24	26	38	41	48	52	57	46	42	27	29	21	37	5
CHINA (HOPEH)														
Peiping	20	24	33	39	40	46	54	47	38	24	23	18	34	23
Tientsin	27	30	35	41	41	49	54	49	38	25	28	24	37	18
CHOSEN														
Tyukotin	39	42	54	62	68	67	73	70	65	48	49	46	57	15
U.S.S.R.														
Blagoveschensk	29	30	38	59	65	65	66	64	53	50	43	36	50	25
Khabarovsk	30	29	39	55	68	52	60	59	49	53	44	41	48	4
Vladivostok	29	30	43	59	66	75	79	71	55	45	39	33	52	36

*Averages are determined from 0700, 1300 and 2100 observations except those marked † which are for 6 observations a day.

Table 3.—Average Number of Clear Days (0-2/10 Sky Cover)

	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Annual	No. yrs. rec.
HEILUNGKIANG														
Manchouli	18	14	15	10	4	5	5	4	7	10	11	14	117	7
Pokotu	8	6	10	5	1	2	1	4	3	6	6	8	60	7
Lungkiang	13	11	9	4	3	1	2	2	5	6	9	12	77	15
Anida	8	4	4	2	*	*	1	2	3	6	5	8	44	7
KIRIN														
Ilan	15	11	8	6	4	2	2	3	3	8	7	11	80	7
Harbin	14	11	8	5	3	2	3	4	7	10	10	12	89	15
Ningan	14	9	8	7	4	6	4	5	7	10	6	8	88	7
Taipingling	8	6	4	2	1	*	1	1	2	6	6	8	46	15
Changchun	17	13	10	5	4	3	2	4	9	11	12	16	106	21
Yenki	9	10	6	5	2	3	2	2	6	10	10	10	75	4
LIAONING														
Taonan	19	16	14	7	5	3	3	5	8	15	14	19	128	8
Mukden	17	14	11	8	5	4	3	5	9	13	13	16	118	24
Notre Dame des Pins	23	21	21	18	18	17	16	14	19	24	22	25	238	4
Yinkow	15	16	13	10	7	6	4	8	11	14	15	15	134	5
KWANTUNG														
Dairen	15	13	10	8	6	5	3	5	10	12	12	13	112	25
Port Arthur	14	12	11	9	7	6	4	6	9	12	10	11	111	24
JEHOL														
Linsi	16	15	13	11	7	8	6	7	10	17	14	17	141	5
CHINA (HOPEH)														
Peiping	19	13	13	8	8	4	3	5	11	18	15	15	132	7
Tientsin	17	15	13	11	10	8	7	8	13	19	16	19	156	11
CHOSEN														
Tyukotin	12	9	7	4	2	2	1	2	2	8	7	10	66	15
U.S.S.R.														
Blagoveschensk	14	13	11	5	2	2	2	3	5	7	9	11	84	24
Khabarovsk	14	12	9	5	3	2	5	6	5	10	10	12	93	6
Vladivostok	13	12	9	4	1	1	1	2	7	7	8	14	79	7

* 0.5 day or less.

3654 ~~3630~~—89—Manchuria—7-11-44—First Proof

By LLR-m NARA, Date 1/31/97

WEATHER INFORMATION, MANCHURIA—Continued

Table 4.—Average Number of Cloudy Days (8/10-10/10) Sky Cover

	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Annual	No. yrs. rec.
HEILUNGKIANG														
Manchouli	2	1	3	4	8	9	11	8	7	6	5	1	65	7
Pokotu	3	6	6	9	13	11	14	11	10	7	8	3	101	7
Lungkiang	3	4	6	9	12	14	15	12	8	6	6	3	98	15
Anida	2	2	5	6	10	9	12	9	5	5	6	2	73	7
KIRIN														
Ilan	4	4	7	7	11	10	13	11	9	7	6	5	94	7
Harbin	3	4	7	9	10	10	11	10	8	7	6	4	89	15
Ningan	3	4	6	7	11	8	10	10	6	6	8	5	84	7
Taipingling	7	8	13	14	19	19	20	19	14	12	10	8	163	15
Changchun	3	3	6	8	10	10	13	10	7	6	5	3	84	21
Yenki	4	2	8	8	13	8	13	12	7	6	6	6	93	4
LIAONING														
Taonan	1	2	2	4	6	7	7	7	4	2	3	1	46	8
Mukden	3	3	6	7	8	9	13	10	7	5	4	4	79	24
Notre Dame des Pins	5	5	4	8	10	9	9	12	9	5	6	3	85	4
Yinkow	3	2	4	5	6	7	11	7	4	4	2	3	59	5
KWANTUNG														
Dairen	4	4	7	8	8	9	14	9	7	4	5	4	83	25
Port Arthur	5	4	5	6	8	8	12	9	7	4	5	4	77	24
JEHOL														
Linsi	4	7	8	7	10	9	13	6	8	4	4	4	84	5
CHINA (HOPEH)														
Peiping	4	5	6	10	8	10	13	12	8	5	5	5	89	7
Tientsin	3	3	5	5	6	7	8	7	4	2	3	3	55	11
CHOSEN														
Tyukotin	5	6	9	10	13	12	15	14	12	8	8	7	119	15
U.S.S.R.														
Blagoveschensk	3	3	4	8	9	11	11	10	7	7	5	4	82	24
Khabarovsk	6	4	6	7	11	13	10	10	8	6	6	6	93	6
Vladivostok	5	4	7	11	14	17	22	15	10	7	7	4	123	7

Table 5.—Average Number of Days with Fog#

	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Annual	No. yrs. rec.
HEILUNGKIANG														
Manchouli	0.6	0.3	1.3	0.6	0.0	0.0	0.0	0.9	0.3	0.3	0.4	0.3	5.0	7
Pokotu	0.1	0.3	0.1	0.3	0.1	0.7	1.3	3.7	1.3	0.1	0.1	0.1	8.2	7
Lungkiang	1.1	0.7	0.4	0.3	0.3	0.7	1.3	2.3	1.4	0.7	0.7	0.5	10.4	15
Anida	1.3	1.3	2.6	0.1	0.0	0.6	0.6	2.9	3.1	2.0	1.4	1.1	17.0	7
KIRIN														
Ilan	0.0	0.0	0.7	0.3	0.4	0.8	1.3	4.6	6.9	1.1	0.0	0.0	16.1	7
Harbin	2.3	2.5	1.5	0.5	0.7	0.6	0.8	1.5	2.9	1.5	1.5	1.7	18.0	15
Ningan	1.4	0.7	0.0	0.0	0.3	1.4	1.1	4.1	5.6	1.0	0.6	0.1	16.3	7
Taipingling	0.1	0.2	0.7	0.9	1.5	2.2	4.8	5.7	3.6	1.7	0.7	0.0	22.1	15
Changchun	0.3	0.5	0.1	0.2	0.1	0.4	0.5	0.9	0.5	0.3	0.4	0.2	4.4	21
Yenki	1.4	0.2	1.3	1.4	0.7	1.1	0.9	2.4	4.3	3.7	2.2	0.5	20.1	7
LIAONING														
Taonan	0.0	0.1	0.1	0.1	0.3	0.9	1.1	1.0	0.8	1.0	0.4	0.0	5.8	8
Mukden	0.6	0.4	0.4	0.4	0.5	0.3	0.5	1.2	0.8	0.8	0.6	0.5	7.0	31
Yinkow	0.6	0.6	0.2	0.4	0.3	0.2	0.2	0.2	0.3	0.7	0.3	0.3	4.0	4
KWANTUNG														
Dairen	0.6	1.1	2.2	2.7	4.0	5.1	7.3	1.0	0.0	0.1	0.3	0.5	24.9	32
Port Arthur	0.1	1.4	2.0	2.4	5.3	4.8	8.5	2.1	0.2	0.3	0.2	0.2	27.5	9
JEHOL														
Linsi	0.0	0.2	0.6	0.4	0.0	0.0	0.2	0.2	0.3	0.0	0.3	0.0	2.3	5
CHINA (HOPEH)														
Peiping	3.8	1.0	2.0	2.2	0.4	1.4	2.4	3.0	2.0	2.0	3.8	6.2	30.2	5
Tientsin	1.6	1.1	0.2	0.1	0.2	0.2	0.1	0.3	0.5	0.6	0.9	0.9	6.7	22
CHOSEN														
Tyukotin	3.3	1.2	0.3	0.3	0.0	0.0	0.3	0.9	0.3	0.3	0.4	3.4	10.7	15
U.S.S.R.														
Blagoveschensk	2.4	2.4	1.3	0.8	1.1	0.9	1.5	1.9	1.6	1.9	2.1	1.8	19.7	14
Khabarovsk	0	*	1	1	0	*	1	1	2	2	*	0	0	6
Vladivostok	2	3	3	6	12	17	18	10	4	4	4	2	85	8

#0.5 day or less.
*Visibility less than ¾ mile.

31654 ~~7630~~—90—Manchuria—7-11-44—First Proof

WEATHER INFORMATION, MANCHURIA—Continued

Table 6.—Average Monthly Precipitation in Inches

	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Annual	No. yrs. rec.
HEILUNGKIANG														
Manchouli	0.1	0.1	0.1	0.2	0.6	1.7	2.9	2.5	1.4	0.3	0.2	0.1	10.1	20
Pokotu	0.1	0.1	0.1	0.4	1.1	3.3	4.2	3.8	2.4	0.3	0.2	0.1	16.0	15
Lungkiang	0.1	0.1	0.2	0.4	1.2	2.7	4.2	3.1	1.6	0.4	0.2	0.1	14.2	20
Anida	0.1	0.2	0.2	0.3	1.2	3.6	4.0	5.4	3.2	0.8	0.6	0.2	19.8	17
KIRIN														
Ilan	0.1	0.2	0.4	0.7	2.0	2.8	4.7	5.2	2.2	1.6	0.3	0.2	20.5	12
Harbin	0.2	0.2	0.5	0.8	1.7	3.9	5.9	4.3	2.2	1.2	0.5	0.2	21.6	20
Ningan	0.1	0.2	0.4	1.0	2.0	3.4	4.6	4.2	2.7	1.3	0.6	0.2	20.8	20
Taipingling	0.2	0.2	0.4	1.0	2.2	3.7	4.7	3.9	3.4	1.4	0.8	0.2	22.0	20
Changchun	0.3	0.2	0.7	0.8	2.2	4.7	7.6	5.2	2.8	1.3	0.8	0.3	26.8	15
Yenki	0.2	0.2	0.5	0.6	1.8	2.8	3.5	4.0	3.6	1.6	0.6	0.2	19.5	14
LIAONING														
Taonan	0.1	0.1	0.2	0.4	0.9	2.3	5.5	5.0	2.3	0.5	0.2	*	17.5	5
Mukden	0.2	0.2	0.8	1.1	2.3	3.6	6.4	6.1	3.0	1.6	0.9	0.3	26.6	29
Notre Dame des Pins	*	0.0	0.0	0.5	1.1	3.6	5.6	7.8	3.3	0.1	0.9	0.0	22.9	4
Yinkow	0.2	0.2	0.7	1.0	1.9	2.3	6.3	6.1	2.7	1.6	0.9	0.3	24.1	30
KWANTUNG														
Dairen	0.5	0.3	0.7	1.0	1.7	1.8	6.4	5.1	4.0	1.1	1.0	0.5	24.1	25
Port Arthur	0.4	0.3	0.6	0.8	1.6	1.6	6.2	5.0	3.5	1.0	1.1	0.6	22.7	24
JEHOL														
Chengteh	0.3	*	0.4	0.8	1.4	3.1	6.8	5.7	1.3	1.0	0.2	0.2	21.2	10
Linsi	*	0.1	0.1	0.4	0.9	2.8	3.9	3.1	1.3	0.6	*	0.1	13.3	5
CHINA (HOPEH)														
Peiping	0.1	0.1	0.2	0.5	1.3	4.8	10.0	5.4	2.5	0.6	0.3	0.1	26.1	37
Tientsin	0.2	0.1	0.4	0.6	1.1	2.5	7.0	5.5	1.8	0.6	0.4	0.2	20.2	44
CHOSEN														
Tyukotin	0.5	0.4	0.8	1.6	3.4	4.5	6.8	6.4	3.9	1.5	1.0	0.5	31.3	10
U.S.S.R.														
Blagoveschensk	0.1	0.1	0.3	0.8	1.6	3.3	4.8	4.6	2.7	0.8	0.3	0.2	19.7	35
Khabarovsk	0.4	0.2	0.4	0.8	2.2	3.5	3.8	3.5	3.1	1.1	0.8	0.5	20.3	9
Vladivostok	0.3	0.3	0.6	1.2	2.0	2.8	3.0	4.3	4.4	1.8	1.2	0.5	22.4	45

*0.5 inch or less.

Table 7.—Average Number of Days with Precipitation of .004 Inch or More

	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Annual	No. yrs. rec.
HEILUNGKIANG														
Manchouli	4	3	3	3	5	10	12	12	8	3	3	4	70	20
Pokotu	4	3	3	5	8	15	14	14	12	4	4	3	89	14
Lungkiang	3	2	4	4	7	12	13	12	9	4	4	3	77	20
Anida	3	4	4	6	8	12	11	12	11	6	6	6	89	21
KIRIN														
Ilan	5	6	6	7	12	13	13	14	12	8	6	5	107	12
Harbin	5	6	6	7	10	14	15	13	12	7	6	6	107	20
Ningan	4	4	6	7	13	16	15	15	13	9	6	4	112	20
Taipingling	6	6	9	9	14	17	16	15	13	9	8	7	129	20
Changchun	6	5	6	7	11	14	16	12	11	8	6	6	108	21
Yenki	3	3	6	5	12	11	13	12	10	6	5	4	90	15
LIAONING														
Taonan	3	3	3	4	8	13	15	14	10	4	3	2	82	8
Mukden	4	3	5	6	10	12	15	12	9	7	5	4	92	24
Notre Dame des Pins	5	1	2	2	8	9	9	8	4	3	2	1	54	3
Yinkow	3	3	5	6	9	10	13	11	8	6	5	4	83	29
KWANTUNG														
Dairen	4	3	4	5	7	8	11	10	7	6	6	5	76	25
Port Arthur	6	3	4	4	7	7	10	9	7	6	7	7	77	24
JEHOL														
Linsi	1	2	2	3	6	10	14	10	8	3	1	1	61	5
CHINA (HOPEH)														
Peiping	3	3	4	5	8	12	15	12	8	5	3	4	82	17
Tientsin	1	1	2	3	4	6	10	9	5	2	2	2	47	44
CHOSEN														
Tyukotin	8	7	9	11	16	15	18	15	12	9	10	10	140	15
U.S.S.R.														
Blagoveschensk	4	2	4	5	6	10	9	10	7	4	4	3	68	20
Khabarovsk	9	5	8	10	12	16	11	13	12	6	9	9	120	7
Vladivostok	3	3	5	7	10	13	13	13	10	6	4	3	91	33

3654 [illegible]—91—Man hu is . 7-11-44—First Proof

WEATHER INFORMATION, MANCHURIA—Continued

Table 8.—Average Number of Days with a Trace or More of Snow

	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Annual	No. yrs. rec.
HEILUNGKIANG														
Manchouli	2	2	2	2	1	0	0	0	1	2	4	3	17	7
Hailar	7	6	5	4	1	.1	0	0	1	4	6	8	42	15
Pokotu	2	3	3	3	2	0	0	0	1	4	5	2	25	7
Lungkiang	4	3	4	2	.3	0	0	0	0	2	4	4	23	15
Anida	3	2	3	2	.1	0	0	0	.2	2	4	4	19	21
KIRIN														
Ilan	5	7	6	2	.3	0	0	0	0	4	6	6	36	7
Harbin	5	5	6	3	.3	0	0	0	.1	2	6	6	34	15
Ningan	4	4	8	3	.3	0	0	0	0	3	6	5	34	7
Taipingling	6	6	8	6	2	0	0	0	.1	3	8	7	46	15
Changchun	8	8	7	4	.2	0	0	0	.1	3	7	8	45	21
Yenki	3	2	5	1	.4	0	0	0	.1	1	4	4	21	22
LIAONING														
Taonan	4	4	3	2	0	0	0	0	.1	1	3	3	20	8
Mukden	5	6	6	2	.1	0	0	0	0	1	5	5	30	19
Yinkow	7	5	4	1	0	0	0	0	0	1	3	3	24	5
KWANTUNG														
Dairen	6	5	4	.3	.1	0	0	0	0	.4	4	7	26	19
Port Arthur	8	4	3	.2	0	0	0	0	0	.2	5	9	29	24
JEHOL														
Linsi	2	3	4	2	.2	0	0	0	.8	2	3	1	18	5
CHINA (HOPEH)														
Peiping	2	2	2	0	0	0	0	0	0	0	1	1	8	37
CHOSEN														
Tyukotin	14	11	12	5	*	0	0	0	0	3	11	15	71	15
U.S.S.R.														
Blagoveschensk	4	2	4	4	1	0	0	0	.2	3	3	3	24	17
Khabarovsk	8	5	8	5	*	0	0	0	1	1	8	9	45	7
Vladivostok	7	4	7	3	*	0	0	0	0	*	3	5	29	8

*0.5 day or less.

Table 9.—Average Number of Days with Snow Cover

	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Annual	No. yrs. rec.
HEILUNGKIANG														
Manchouli	31	28	29	6	.1	0	0	0	0	5	23	31	154	7
Pokotu	31	28	28	7	1	0	0	0	1	6	25	31	159	7
Lungkiang	31	25	13	1	0	0	0	0	0	3	16	25	113	7
Anida	26	20	7	.4	0	0	0	0	0	2	12	19	87	7
KIRIN														
Ilan	31	28	20	2	0	0	0	0	0	4	14	27	127	6
Harbin	31	28	21	2	0	0	0	0	0	3	20	29	133	7
Ningan	31	28	27	3	.1	0	0	0	0	3	21	31	145	7
Taipingling	31	28	31	8	.6	0	0	0	0	5	23	31	158	7
Changkiawan	25	19	11	.6	0	0	0	0	.1	3	7	16	81	7
Yenki	14	11	6	.6	0	0	0	0	0	2	6	16	55	7

Table 10.—Average Number of Days with Thunderstorms

	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Annual	No. yrs. rec.
HEILUNGKIANG														
Manchouli	0.0	0.0	0.0	0.0	0.4	2.9	5.1	4.0	1.0	0.0	0.0	0.0	13.4	7
Pokotu	0.0	0.0	0.0	0.7	1.0	4.4	5.9	5.1	1.9	0.1	0.0	0.0	19.1	7
Chalantun	0.0	0.0	0.0	0.3	1.1	5.1	8.3	4.9	2.0	0.3	0.0	0.0	22.0	7
Lungkiang	0.0	0.0	0.0	0.1	0.6	2.8	3.9	2.6	0.9	0.1	0.1	0.1	11.2	15
Anida	0.0	0.0	0.0	0.1	0.1	2.7	2.0	1.7	0.0	0.0	0.0	0.0	8.5	7
KIRIN														
Ilan	0.0	0.0	0.0	0.1	0.7	2.3	1.7	1.9	0.4	0.4	0.0	0.0	7.5	7
Harbin	0.0	0.0	0.0	0.2	1.5	3.7	3.9	2.8	1.7	0.7	0.0	0.0	2.4	15
Ningan	0.0	0.0	0.0	0.1	0.7	3.3	4.0	1.4	1.1	0.3	0.0	0.0	10.9	7
Taipingling	0.0	0.0	0.0	0.1	0.6	3.3	2.1	1.6	0.9	0.2	0.0	0.0	8.8	15
Changchun	0.0	0.0	0.1	0.2	1.3	5.7	5.6	2.8	1.6	1.0	0.1	0.0	18.4	19
Yenki	0.0	0.0	0.0	0.3	0.9	3.9	3.6	2.3	1.3	0.7	0.0	0.0	13.0	7
LIAONING														
Mukden	0.0	0.0	0.0	0.3	1.9	4.1	3.1	2.6	2.1	1.3	0.1	0.0	15.5	19
Notre Dame des Pins	0.0	0.0	0.0	1.0	3.5	6 2	4.5	3.5	2.2	1.0	0.0	0.0	21.9	4
KWANTUNG														
Dairen	0.0	0.0	0.1	0.4	1.1	2.2	2.3	2.1	2.0	1.2	0.3	0.0	11.7	19
CHINA (HOPEH)														
Tientsin	0.0	0.0	0.0	0.4	1.3	4.9	5.1	3.0	2.4	0.4	0.0	0.0	17.5	22
CHOSEN														
Tyukotin	0.0	0.0	0.0	0.3	2.9	6.7	4.9	3.2	1.9	0.7	0.1	0.0	20.7	15
U.S.S.R.														
Blagoveschensk	0.0	0.0	0.0	0.3	1.8	6.0	6.9	5.5	1.6	0.2	0.0	0.0	22.3	18
Khabarovsk	0.0	0.0	0.0	*	2	4	4	3	2	1	0.0	0.0	16	6
Vladivostok	0.0	0.0	0.0	*	*	1	*	*	*	1	*	0.0	2	—

*0.5 day or less.

#434 -92—Manchuria—7-11-44—First Proof

WEATHER INFORMATION, MANCHURIA—Continued

Table 11.—Prevailing Direction of Winds

	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Annual	No. yrs. rec.
HEILUNGKIANG														
Manchouli	SW	SW	SW	NW	NW	W	E	W	W	W	SW	SW	SW	7
Pokotu	NW	NW	NW	NW	NW	NW	SE	SE	NW	NW	NW	NW	NW	7
Lungkiang	NW	NW	NW	NW	N	N	S	S	NW	NW	NW	NW	NW	15
Anida	NW	NW	NW	NW	NW	NW	NW	NW	NW	NW	NW	NW	NW	13
KIRIN														
Han	SW	SW	SW	SW	SW	SW	SW	SW	SW	SW	SW	SW	SW	7
Harbin	SW	SW	W	W	SW	S	S	S	S	W	S	SW	S	15
Ningan	SW	SW	SW	SW	SW	SW	SW	NE	SW	SW	SW	SW	SW	7
Taipingling	NW	NW	NW	SE	SE	SE	SE	SE	SE	W	NW	NW	SE	15
Changkiawan	W	W	W	W	SW	SW	SW	SW	W	W	W	W	W	7
Yenki	W	W	W	W	E	NE	NE	E	W	W	W	W	W	7
LIAONING														
Taonan	W	W	NW	NW	NW	S	S	S	SW	NW	W	W	NW	8
Mukden	NE	NE	W	SW	SW	S	S	S	SE	S	W	S	S	20
Notre Dame des Pins	NE	NW	SW	NW	SW	SW	SW	NE	NE	SW	NW	NW	SW	3
Antung	NE	NE	NW	SW	SW	SW	S	SW	NE	NW	NW	NW	NW	12
KWANTUNG														
Dairen	N	N	NW	S	S	S	S	S	S	S	N	N	S	10
Port Arthur	N	N	N	S	SE	SE	SE	E	N	NW	NW	N	N	20
CHINA (HOPEH)														
Tientsin	N	N	SE	SE	SE	SE	SE	E	S	SW	N	NW	SE	22
CHOSEN														
Tyukotin	NE	NE	NW	W	NW	SW	SW	SW	E	E	E	E	E	10
U.S.S.R.														
Blagoveschensk	NW	NW	NW	NW	NW	NW	NW	NW	NW	NW	NW	NW	NW	19
Khabarovsk	NW	NW	NW	NW	NW	NW	NW	NW	NW	NW	NW	NW	NW	3
Vladivostok	N	N	N	SE	SE	SE	SE	SE	N	N	N	N	N	34

Table 12.—Percentage Frequency of Winds from Various Directions in January

	N	NE	E	SE	S	SW	W	NW	Calm
HEILUNGKIANG									
Manchouli	1	2	4	1	4	31	24	4	29
Hailar	5	9	3	*	4	10	10	5	54
Mientuho	2	*	1	2	0	1	12	10	72
Pokotu	13	2	2	2	1	1	15	43	21
Chalantun	35	2	1	5	2	1	3	43	8
Lungkiang	20	6	2	4	7	10	15	31	5
Anida	7	3	4	8	13	20	21	21	3
KIRIN									
Ilan	3	1	*	*	4	48	2	1	41
Harbin	5	3	4	5	24	22	26	10	1
Imienpo	2	*	6	9	5	29	21	11	17
Ningan	*	5	1	1	6	25	12	6	44
Taipingling	9	1	*	10	3	1	26	34	16
Changkiawan	4	3	1	2	11	19	20	13	27
Yenki	*	1	1	0	*	2	28	21	47
LIAONING									
Notre Dame des Pins	11	32	6	5	2	15	10	19	0
Yinkow	27	23	6	13	16	5	2	5	3
Taonan	14	4	4	3	7	12	29	23	4
JEHOL									
Chanheou	34	8	8	1	9	18	5	17	0
U.S.S.R.									
Pokrovka	1	3	1	0	0	6	8	2	79
Blagoveschensk	7	2	*	1	4	2	5	36	43
Khabarovsk	9	2	1	6	22	16	12	29	3
Vladivostok	29	4	0	1	0	1	1	33	24

*Less than 0.6 percent.

(365-44 3629—93—Manchuria—7-11-44—First Proof

WEATHER INFORMATION, MANCHURIA—Continued

Table 13.—Percentage Frequency of Winds from Various Directions in July

	N	NE	E	SE	S	SW	W	NW	Calm
HEILUNGKIANG									
Manchouli	4	10	14	7	7	7	11	11	29
Hailar	7	5	11	6	7	8	14	12	30
Mientuho	6	5	14	13	6	2	8	9	37
Pokotu	8	9	13	15	5	2	6	12	30
Chalantun	27	10	3	10	10	4	4	21	11
Lungkiang	14	15	7	10	15	15	8	11	5
Anida	7	7	11	15	22	18	7	7	6
KIRIN									
Ilan	10	10	5	3	7	23	6	1	35
Harbin	5	7	14	13	29	18	9	4	1
Imienpo	4	3	12	14	9	20	9	9	20
Ningan	2	14	4	2	5	27	11	4	31
Taipingling	4	1	7	34	11	5	10	10	18
Changkiawan	4	6	7	9	14	23	14	6	17
Yenki	2	16	16	1	*	5	6	6	48
LIAONING									
Notre Dame des Pins	6	5	6	5	33	38	3	4	0
Yinkow	8	7	6	18	28	20	7	3	3
Taonan	12	14	11	8	17	14	13	7	4
U.S.S.R.									
Pokrovka	3	11	13	3	3	16	17	4	30
Blagoveschensk	9	6	4	9	16	9	4	17	26
Khabarovsk	18	3	3	6	15	9	2	40	3
Vladivostok	4	1	6	49	5	4	2	4	18

*0.5 percent or less.

Table 14.—Average Hourly Wind Velocity (m.p.h.)

	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Annual	No. yrs. rec.
HEILUNGKIANG														
Manchouli	6.4	7.6	7.5	9.2	9.2	7.3	6.9	6.4	7.8	8.4	7.5	7.5	7.6	7
Pokotu	8.4	8.5	8.8	9.9	9.3	6.0	5.1	4.9	6.4	8.5	8.1	10.3	7.8	7
Lungkiang	9.5	10.3	12.1	14.1	13.0	10.7	9.6	8.7	10.4	11.6	10.4	9.8	10.8	15
Anida	7.7	8.4	9.3	11.5	11.3	9.3	7.8	6.7	7.3	8.8	8.2	8.0	8.7	7
KIRIN														
Ilan	7.7	7.1	6.0	6.6	6.6	5.6	4.8	4.3	4.4	6.3	6.8	8.7	6.2	7
Harbin	12.1	11.9	13.4	15.4	14.2	12.4	10.9	10.1	11.5	13.6	13.2	12.3	12.6	15
Ningan	5.2	5.8	6.9	9.2	7.8	6.0	5.3	4.6	5.3	6.5	5.9	5.4	6.2	7
Taipingling	10.5	9.5	10.3	11.0	10.1	7.9	6.9	6.8	7.8	9.2	9.6	10.4	9.2	15
Changchun	7.8	8.7	10.1	11.4	10.3	8.3	6.5	5.4	6.5	8.1	9.4	8.9	8.5	21
Yenki	7.3	6.2	6.1	5.0	4.2	3.4	3.1	2.2	3.0	4.3	4.9	7.5	4.8	6
LIAONING														
Taonan	6.2	6.8	9.0	10.1	9.5	8.1	6.6	7.3	7.5	7.9	7.0	6.8	7.7	8
Mukden	5.1	5.8	7.2	8.1	7.6	6.3	5.1	4.3	4.5	5.6	6.0	5.4	5.9	24
Notre Dame des Pins	10.6	12.4	16.4	12.4	11.8	12.4	10.0	10.0	10.0	11.2	13.0	8.8	11.6	3
Yinkow	13.0	11.0	15.7	16.3	15.9	13.9	11.4	8.9	11.0	12.3	15.0	12.8	13.1	5
KWANTUNG														
Dairen	10.7	10.5	11.9	12.1	11.6	9.8	9.4	8.1	8.9	10.3	11.2	11.2	10.5	5
Port Arthur	9.6	9.2	9.6	9.6	9.2	6.9	6.5	6.0	6.9	8.1	9.8	9.8	8.5	24
JEHOL														
Linsi	10.1	9.2	8.4	9.9	10.8	8.1	4.6	4.2	5.5	7.7	9.2	9.7	8.1	5
CHINA (HOPEH)														
Tientsin	4.9	5.4	6.3	6.9	6.7	5.8	4.9	4.0	4.5	5.1	5.4	5.4	5.4	22
CHOSEN														
Tyukotin	1.6	2.2	3.6	4.9	4.7	4.0	3.1	2.7	2.7	3.4	3.1	2.2	3.2	15
U.S.S.R.														
Blagoveschensk	3.7	4.5	5.7	8.3	7.7	6.9	5.2	5.0	5.7	6.2	5.7	4.6	5.8	19

3654 2000—94—Manchuria—7-11-44—First Proof

WEATHER INFORMATION, MANCHURIA—Continued

Table 15.—Average Number of Days with Gales#

	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Annual	No. yrs. rec.
HEILUNGKIANG														
Manchouli	0.3	0.1	1.0	1.6	1.6	0.7	0.6	0.9	1.0	1.3	1.0	0.3	10.4	7
Pokotu	0.9	0.6	2.1	4.1	3.6	0.3	0.6	0.4	0.6	3.0	1.3	1.6	19.1	7
Lungkiang	0.5	1.0	2.1	5.8	5.0	1.9	1.3	0.3	1.1	2.0	0.8	1.1	22.9	15
Anida	0.5	0.6	1.9	2.9	1.4	0.8	0.2	0.2	0.3	1.0	0.4	0.1	10.3	13
KIRIN														
Ilan	0.7	1.3	0.9	1.7	1.7	0.6	0.5	0.5	0.5	0.3	1.0	1.1	10.8	7
Harbin	0.3	0.5	1.1	3.9	3.0	1.6	0.9	0.3	0.5	1.7	1.2	0.6	15.6	15
Ningan	0.0	0.0	0.0	0.1	0.7	3.3	4.0	1.4	1.1	0.3	0.0	0.0	10.9	7
Taipingling	0.0	0.0	0.0	0.1	0.6	3.3	2.1	1.6	0.9	0.2	0.0	0.0	8.8	15
Changchun	0.0	0.0	0.0	0.1	0.2	1.3	5.7	5.6	2.8	1.6	1.0	0.1	18.4	19
Yenki	3.7	2.8	2.7	1.8	0.9	0.6	0.3	0.0	0.1	1.8	1.5	3.8	20.0	6
LIAONING														
Taonan	1.3	1.9	5.0	11.0	10.6	4.0	2.9	1.0	3.1	4.1	3.0	1.6	49.5	8
Mukden	0.5	0.6	2.2	3.7	3.9	0.7	0.3	0.1	0.3	0.9	1.5	0.9	15.6	15
Antung	1.9	1.6	1.2	1.6	1.2	0.7	2.0	1.2	1.8	1.5	2.1	1.6	18.4	12
Yinkow	1.0	1.5	3.0	6.0	3.0	1.0	0.3	0.1	0.1	0.5	1.0	1.5	19.0	10
KWANTUNG														
Dairen	7.7	5.7	10.8	11.1	10.5	6.5	4.1	2.5	4.1	5.7	8.6	6.7	84.0	15
Port Arthur	5.7	3.5	6.2	8.6	7.4	1.5	1.5	1.0	2.1	3.6	6.3	6.0	53.4	10
JEHOL														
Linsi	7.8	3.2	8.6	11.2	10.8	5.0	1.3	1.3	3.3	9.7	9.3	10.0	81.5	5
CHINA (HOPEH)														
Tientsin	0.5	0.9	1.3	1.3	0.6	0.7	0.2	0.1	0.1	0.2	1.1	0.5	7.5	15
CHOSEN														
Tyukotin	0.0	0.0	0.3	1.3	0.7	0.3	0.2	0.0	0.0	0.2	0.5	0.4	3.9	10
U.S.S.R.														
Blagoveschensk	1.0	1.4	2.0	3.8	4.3	2.2	2.0	1.1	1.2	2.5	1.6	1.2	24.3	21
Khabarovsk	1	*	2	1	2	1	1	1	2	4	3	1	19	6
Vladivostok	2.0	1.0	1.0	1.0	1.0	0.5	0.5	0.9	1.0	0.1	2.0	2.0	14.0	19

#34 miles per hour or over, although some data questionable as to velocities of gales. (Taonan, Dairen, Linsi).
*0.5 day or less.

Table 16.—Average Daily Maximum Temperature (°F.)

	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Annual	No. yrs. rec.
HEILUNGKIANG														
Manchouli	−5	2	19	38	62	73	81	76	63	42	17	−1	39	4
Hailar	−8	1	18	44	63	74	82	76	63	44	17	−4	39	19
Pokotu	1	5	22	44	60	72	78	73	61	42	19	3	40	5
Lungkiang	6	17	32	54	68	79	84	81	68	52	28	10	48	16
Anida	−4	13	26	50	64	75	80	78	64	49	19	−3	42	6
KIRIN														
Ilan	4	13	29	51	63	76	81	79	68	50	26	9	46	5
Harbin	6	16	32	54	68	79	84	81	69	53	29	11	48	20
Ningan	8	17	33	54	67	78	83	80	70	54	31	11	49	6
Taipingling	7	15	27	48	61	71	76	76	64	50	28	10	44	15
Changchun	12	21	35	56	70	80	84	82	71	56	34	17	52	21
Yenki	17	26	39	58	68	78	83	82	72	59	38	22	54	7
LIAONING														
Taonan	15	19	40	56	70	81	85	80	70	56	34	18	52	5
Mukden	20	28	41	60	73	83	86	85	75	61	40	25	56	24
Yinkow	24	29	41	58	71	80	85	84	75	62	43	29	57	29
KWANTUNG														
Dairen	30	33	43	58	68	77	81	83	75	65	49	35	58	25
Port Arthur	31	34	43	57	68	76	81	83	76	66	50	36	58	24
JEHOL														
Linsi	18	23	39	56	71	77	82	79	70	56	33	24	52	5
CHINA (HOPEH)														
Peiping	30	35	46	65	77	84	83	82	75	64	47	34	60	9
Tientsin	33	39	51	68	80	87	90	87	79	68	50	36	64	20
CHOSEN														
Tyukotin	10	21	36	56	68	79	84	83	70	59	36	17	52	12
U.S.S.R.														
Khabarovsk	−4	6	21	41	56	67	75	75	62	48	23	2	40	7
Vladivostok	13	22	33	46	55	63	71	75	68	55	36	20	46	14

3654 ~~3660~~ —95—Manchuria—7-11-44—First Proof

WEATHER INFORMATION, MANCHURIA—Continued

Table 17.—Average Daily Minimum Temperature (°F.)

	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Annual	No. yrs. rec.
HEILUNGKIANG														
Manchouli	−25	−18	−4	21	36	50	57	52	39	21	−3	−19	17	7
Hailar	−29	−23	−8	21	36	48	57	52	38	21	−4	−24	15	20
Pokotu	−16	−11	3	22	36	46	54	50	38	23	3	−10	20	25
Lungkiang	−16	−8	8	28	42	55	64	60	46	29	7	−10	25	27
Anida	−24	−12	0	25	38	52	59	57	42	25	22	−20	20	6
KIRIN														
Ilan	−15	−7	8	30	44	54	64	61	48	32	12	−6	27	7
Harbin	−15	−6	10	31	44	56	64	62	47	32	10	−8	27	20
Ningan	−20	−10	9	29	42	52	62	60	45	30	9	−11	25	7
Taipingling	−9	−3	10	29	41	51	59	58	45	30	12	−5	26	15
Changchun	−10	−2	13	32	45	57	65	62	47	33	14	−3	29	21
Yenki	−6	0	14	30	43	53	63	63	48	31	16	2	30	7
LIAONING														
Taonan	−9	−5	14	30	44	57	66	62	49	32	12	−4	29	5
Mukden	−2	4	20	36	49	60	68	66	52	38	20	4	34	24
Yinkow	4	8	23	37	51	61	69	68	55	41	24	10	38	29
KWANTUNG														
Dairen	16	19	29	41	52	62	69	71	61	49	34	21	44	25
Port Arthur	17	19	28	40	50	60	68	70	61	50	34	22	43	24
JEHOL														
Linsi	−7	−1	12	28	41	52	60	54	43	29	10	−4	26	5
CHINA (HOPEH)														
Peiping	13	18	28	44	55	65	70	68	58	44	31	18	43	7
Tientsin	16	21	33	45	56	66	73	72	62	48	33	20	46	20
CHOSEN														
Tyukotin	−20	−11	11	32	43	54	64	62	47	32	16	−7	27	12
U.S.S.R.														
Khabarovsk	−16	−8	6	27	42	55	63	62	50	34	11	−9	26	7
Vladivostok	0	6	19	34	43	52	60	64	55	41	24	8	34	27

Table 18.—Extreme Monthly Maximum Temperature (°F.)

	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Annual	No. yrs. rec.
HEILUNGKIANG														
Manchouli	17	17	50	71	89	89	101	104	89	64	42	15	104	4
Hailar	21	36	57	83	87	102	104	103	92	75	50	28	104	19
Pokotu	27	31	62	78	81	97	100	88	89	68	43	23	100	5
Lungkiang	36	53	71	88	92	102	104	104	95	81	60	33	104	16
Anida	41	32	60	83	91	97	98	99	94	76	54	41	99	6
KIRIN														
Ilan	32	36	56	77	84	96	92	95	84	75	51	32	96	6
Harbin	37	52	67	85	92	102	102	96	88	79	64	45	102	26
Ningan	33	38	64	80	89	97	97	98	85	80	56	36	98	6
Taipingling	38	46	61	74	84	92	95	96	82	80	58	40	96	15
Changchun	38	51	68	86	92	103	101	99	89	86	75	45	103	21
Yenki	45	47	67	82	94	99	103	105	89	79	61	39	105	37
LIAONING														
Taonan	35	42	61	83	96	98	103	99	88	81	63	37	103	5
Mukden	46	54	58	87	92	103	102	99	93	87	78	52	103	24
Yinkow	49	50	65	82	87	95	95	98	91	80	73	53	98	28
KWANTUNG														
Dairen	50	55	64	83	88	95	95	96	88	81	73	55	96	25
Port Arthur	49	54	70	83	93	94	95	96	89	81	76	57	96	24
JEHOL														
Linsi	43	53	68	82	92	93	101	94	94	84	54	50	101	5
Chanheou	57	72	77	97	108	109	106	105	97	100	77	61	109	7
CHINA (HOPEH)														
Peiping	48	61	85	90	98	107	102	95	94	83	71	56	107	34
Tientsin	54	64	77	96	107	107	109	103	92	88	78	53	109	21
CHOSEN														
Tyukotin	40	47	64	82	88	96	98	100	91	79	71	43	100	15
U.S.S.R.														
Khabarovsk	22	38	51	74	82	92	94	95	82	71	54	34	95	22
Vladivostok	37	46	56	66	74	88	92	90	84	73	63	51	92	15

3630—96—Manchuria—7-11-44—First Proof

WEATHER INFORMATION, MANCHURIA — Continued

Table 19.—Extreme Monthly Minimum Temperature (°F.)

	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Annual	No. yrs. rec.
HEILUNGKIANG														
Manchouli	−45	−33	−30	−8	19	32	44	30	21	−7	−34	−39	−45	7
Hailar	−57	−52	−34	−17	17	29	43	32	19	−17	−35	−52	−57	20
Pokotu	−35	−27	−24	−2	22	28	39	33	22	−2	−20	−32	−35	7
Lungkiang	−48	−41	−19	2	20	37	49	40	27	4	−26	−33	−48	16
Anida	−50	−47	−32	0	19	31	44	37	23	−8	−21	−41	−50	13
KIRIN														
Ilan	−34	−29	−24	11	24	39	48	49	31	6	10	−27	−34	7
Harbin	−40	−40	−16	5	22	39	49	37	27	5	−25	−29	−40	26
Ningan	−43	−39	−20	12	28	36	47	45	25	7	−21	−29	−43	7
Taipingling	−34	−28	−16	7	22	34	41	40	25	5	−16	−28	−34	15
Changchun	−32	−33	−15	4	26	40	48	44	27	8	−17	−28	−33	21
Yenki	−31	−25	−9	12	25	39	47	48	29	10	−8	−16	−31	7
LIAONING														
Taonan	−34	−29	−12	15	29	39	57	48	29	11	−12	−23	−34	5
Mukden	−27	−27	−6	18	28	44	51	49	30	14	−15	−25	−27	24
Yinkow	−21	−24	−9	6	30	45	54	51	32	17	−10	−19	−24	28
KWANTUNG														
Dairen	−3	−3	10	25	35	52	59	59	42	27	11	−2	−3	25
Port Arthur	−3	−3	10	25	32	50	59	58	43	27	12	−1	−3	24
JEHOL														
Linsi	−26	−21	−10	8	15	34	45	36	26	14	−11	−20	−26	5
Chanheou	−18	−26	14	16	27	48	54	49	34	19	0	−11	−26	7
CHINA (HOPEH)														
Peiping	−3	−4	12	26	39	47	60	56	41	25	8	1	−4	34
Tientsin	−3	−1	13	27	38	49	62	57	40	31	10	−2	−3	21
CHOSEN														
Tyukotin	−43	−39	−24	10	27	37	48	40	25	12	−23	−39	−43	15
U.S.S.R.														
Khabarovsk	−46	−41	−20	1	25	35	40	46	25	11	−19	−30	−46	14
Vladivostok	−22	−20	−7	17	31	39	47	50	39	17	0	−15	−22	32

Table 20.—Average Number of Days with Minimum Temperature 32° or Lower

	Jan.	Feb	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Annual	No. yrs. rec.
HEILUNGKIANG														
Manchouli	31	28	31	26	10	*	0	*	7	29	30	31	223	7
Hailar	31	28	29	6	0	0	0	0	*	7	27	31	159	7
Pokotu	31	28	31	26	10	*	0	0	7	28	30	31	223	7
Lungkiang	31	27	19	1	0	0	0	0	0	2	22	31	133	7
Anida	31	28	30	21	3	0	0	0	1	19	30	31	195	7
KIRIN														
Ilan	31	28	31	19	1	0	0	0	1	17	30	31	188	7
Harbin	31	28	30	17	2	0	0	0	1	16	30	31	185	15
Ningan	31	28	31	21	2	0	0	0	2	20	30	31	195	7
Taipingling	31	28	24	4	0	0	0	0	0	4	21	31	142	7
Changchun	31	28	30	16	2	0	0	0	1	13	29	31	181	14
Yenki	31	28	30	18	2	0	0	0	*	18	30	31	188	7
LIAONING														
Mukden	31	28	28	10	*	0	0	0	*	9	27	31	165	20
KWANTUNG														
Port Arthur	14	13	7	1	0	0	0	0	0	*	4	12	52	24
CHINA (HOPEH)														
Peiping	31	28	20	2	0	0	0	0	0	2	22	30	135	7
Tientsin	31	27	17	1	0	0	0	0	0	*	14	30	121	17
CHOSEN														
Tyukotin	31	28	30	19	2	0	0	0	1	14	28	31	184	10
U.S.S.R.														
Blagoveschensk	31	28	30	23	4	0	0	0	1	22	30	31	200	19
Khabarovsk	31	28	31	23	2	0	0	0	*	12	29	31	187	7
Vladivostok	31	28	31	11	1	0	0	0	0	3	24	31	160	5

*0.5 day or less.

3654 3630—97—Manchuria—7-11-44—First Proof

WEATHER INFORMATION, MANCHURIA—Concluded

Table 21.—Average Monthly Relative Humidity in Percent*

	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Annual	No. yrs. rec.
HEILUNGKIANG														
Lungkiang	69	68	60	44	49	64	72	75	70	64	66	68	64	5
KIRIN														
Harbin	80	80	74	65	62	72	76	77	77	69	67	76	73	2
Changchun	71	68	59	51	54	64	75	78	71	65	66	68	66	21
LIAONING														
Taonan	70	68	56	50	48	58	72	77	68	62	61	64	63	5
Mukden	65	61	55	52	57	63	75	77	72	68	63	65	64	24
Yinkow	65	62	59	56	59	66	76	77	70	67	64	64	64	29
Antung	71	70	68	70	74	81	87	84	78	75	70	70	75	28
KWANTUNG														
Dairen	65	63	60	57	62	70	83	80	70	64	62	62	66	25
Port Arthur	60	61	60	59	64	76	87	83	72	64	62	62	68	10
JEHOL														
Linsi	58	54	45	34	35	44	59	59	43	57	56	55	50	3
CHINA (HOPEH)														
Peiping	62	56	52	48	51	59	76	78	71	66	60	62	62	10
Tientsin	59	58	56	51	55	63	75	76	69	63	61	58	62	18
CHOSEN														
Ryuganpo	71	70	68	70	74	81	86	84	78	75	70	70	75	15
Tyukotin	81	77	68	61	65	71	78	80	80	72	74	79	74	15
Yuki	50	52	55	62	75	83	88	83	71	61	54	49	65	15
U.S.S.R.														
Pokrovka	80	79	71	62	54	68	74	78	74	73	82	83	73	6
Blagoveschensk	74	71	65	60	53	72	75	76	71	66	75	76	70	6
Khabarovsk	72	70	69	63	71	75	79	81	78	69	73	75	73	—
Vladivostok	67	68	70	71	77	86	89	86	79	68	65	66	74	16

*Mean of 3 or more observations per day.

3654 ~~3630~~—98—Manchuria—7-11-44—First Proof

Gazetteer and Glossary

GAZETTEER

One of the most confusing factors in dealing with maps of Manchuria is the diversity and variation of place names. The transliteration procedure adopted for both ground and air sheets made under U.S. Army authorities and recommendation of the U.S. Board on Geographical Names finds the following systems used: Chinese place names transcribed according to the Wade-Giles system, Korean names according to the McCune-Reischauer system, Japanese forms of Korean names carried in parentheses according to the Modified Hepburn (Romaji) system, Mogol names carried in parentheses have been transcribed from Japanese Kana. Following is a selected list of Manchurian place names and their variants as well as a very brief glossary of common geographical terms.

PROVINCES: The four (4) original provinces, Liaoning (also known as Fengtien and Shengking) Kirin, Heilungkiang, and Jehol, have been further subdivided by the Japanese authorities into administrative areas. The most recent list available (1941) gives twenty (20) divisions as follows:

1. Antung Sheng
2. Chientao Sheng
3. Chinchow Sheng
4. Fengtien Sheng
5. Heiho Sheng
6. Hsingan-hsi Sheng
7. Hsingan-nan Sheng
8. Hsingan-pei Sheng
9. Hsingtan-tung Sheng
10. Jehol Sheng
11. Kirin Sheng
12. Lungkiang Sheng
13. Mutankiang Sheng
14. Peian Sheng
15. Pinkiang Sheng
16. Sankiang Sheng
17. Ssuping Sheng
18. Tungan Sheng
19. Tungua Sheng
20. Hsinking Special Municipality

RIVERS:

Preferred English Transliteration	Chinese Source	Japanese Source
1. Amur	(Hei-lung Chiang)	Hei-lung Chiang
2. Argun	O-erh-ku-na Ho (Chinese phonetization)	O-erh-k'o-no Ho also Argun
3. Hun River	Hun Chiang	
4. Liao Ho (River)	Liao Ho	Ta-liao Ho, Liao Ho
5. Nonni River	Nen-Chiang	Nen Chiang
6. Sungari River	Sung-hua Chiang	Sung-hua
7. T'ao-erh Ho (River)	(T'ao-erh Ho)	T'ao-erh Ho
8. Ussuri River	(Wu-su-li Chiang)	Wu-shu-li Ho
9. Yalu River	Ya-lu Chiang Korean name-Amnok Kang	Oryok-ko

TOWNS AND CITIES:

Preferred English Transliteration	Chinese Source	Japanese Source	Russian Source
A-ch'eng	A-ch'eng	Acheng (Ashihho)	Acheng
Ai-hun	Ai-hun	Aigun	Aigun
Ang-ang-ch'i	Ang-ang-ch'i also known as Ang-ang-hsi	Ang-ang-ch'i Ang-ang-hsi Ang-ang-ki	Anganghsi
An-shan	An-shan	Anshan Anshanchan	Anshan
An-ta	An-ta	Anta	Anta
An-tung	An-tung	Antung	Antung
Cha-lan-t'un	Cha-lan-t'un	Chalant'un	Chalantun
Chang-te (Jehol)	Ch'eng-te	Chengte (Jehol)	Chengte
Chang-chun	Ch'ang-sh'un	Hsingking (Changchun)	Changchun
Chia-mu-ssu	Chia-mu-ssu formerly known as Hua-ch'uan-hsien	Chiamussu (Huach'uanhsien)	Ch'iamussu Huachuan
Chin-hsien (Chinchou)	Chin-hsien Chin-chou	Chinchou Chinhsien	Chinchou
Ch'ih-feng (Hata)	Ch'ih-feng	Chihfeng	Chihfeng
(Ta-lien) Dairen	Ta-lien	Dairen	Dal'niy
Fo-shan	Fo-shan	Foshanchen	Foshan
Fu-chin	Fu-chin	Fuchin (Fukin)	Fuchin
Fou-hsin (Fuhsin)	Fou-hsin	Fouhsin, Fuhsin, Fusin	Fuhsin
Fu-shun	Fu-shun	Fushun	Fushun
Fu-sung	Fu-sung	Fusung	Fusung
Hailar (Hulun)	Hu-lun, Hai-la-erh	Hailar, Hulun Hai-la-erh	Khaylar, Hulun
Hai-lun	Hai-lun	Hailun	Hailun
Wenchuan (Ha-lun-ar-shan)	Ha-lun-arh-shan	Harunarushan	Khalun-arshan
Harbin (Pin-chiang)	Pin-chiang, Ha-erh-pin	Harbin (Pinchiang)	Kharbin
Hei-ho (Ai-hun-hsien)	Hei-ho (Ai-hun-hsien) Ta-hei-ho	Heiho (Aihun) Aihunhsien	Aihun
Hsiao-ch'eng-tzu	Hsiao-ch'eng-tzu	Hsiachengtzu	Hsiajentzu
Hsin-an-chen (hsin-chi-ch'ang)	Hsin-an Hsin-chi-ch'ang	Hsinanchen	Hsinanchen
Hsin-li-t'un	Hsin-li-t'un	Hsinlitun	Hsinlitun
Hun-ch'un	Hun-ch'un	Hunchun	Hunchun
Hu-lin	Hu-lin (Ni-ma-k'ou)	Hulin	Hulin
Hu-t'ou	Hu-t'ou	Hutou	———
Hu-lu-tao	Hu-lu-tao	Hulutao	Hulutao
I-hsien (I-chou)	I-hsien (I-chou)	Ichou (Ihsien)	Ichou
Ilan (San-hsing)	I-lan (Shan-hsing)	Ilan (Sanhsing)	Ilan (Sanhsing)
I-mien-p'o	I-mien-p'o	Imienpo	Imienpo
Jao-ho	Jao-ho	Jaoho	Jaoho
Kan-ching-tzu (Kanseishi)	Kan-ching-tzu	Kanseishi	———
Kirin (Chi-lin) (Yung-chi)	Yung-chi (Chi-lin)	Chilin	Girin
Ku-pei-k'ou	Ku-pei-k'ou	Kupeikou	Kupeikou
Liao-yuan (Cheng-chia-t'un)	Liao-yuan (Chen-chia-t'un)	Liaoyuan (Chengchiatun)	Liaoyuan (Chengchiatun)
Lien-chiang-k'ou	Lien-chiang-k'ou	Lienchiangkou	Lienchiangkou
Lin-k'ou	Lin-k'ou	Linkou	———
Lin-hsi	Lin-hsi	Linhsi	Linhsi
Li-shu-chen (Li-shu-kou)	Li-shu-chen (Li-shu-kou)	Lishuchen	Lishuchen
Lo-pei	Lo-pei	Lopei (Chaohsingchen)	Lopei
Lu-pei	Lu-pei	Lupei, Lupeh	Lupei
Man-chou-li	Man-chou-li (Lu-pin)	Manchouli	Manchzhuriya
Mi-shan	Mi-shan	Mishan	Mishan
Mo-ho	Mo-ho	Moho	Moho
Mukden (Shen-yang) (Feng-t'ien)	Shen-yang Feng-t'ien	Mukden Fengtien	Mukden
Mu-tan-chiang	Mu-tan-chiang	Mutanchiang	Mutantsang
Mergen (Nen-chiang)	Nen-chiang	Mergen, Nenchiang	Mergen
Niu-chuang	Niu-chuang	Newchwang	———
No-ho (Porto)	No-ho	Noho	Noho
Ou-p'u	Ou-p'u	Oupu	Oupu
Pei-piao	Pei-p'iao	Peipiao	Peipiao
Pen-ch'i-hu (Penhsihu)	Pen-ch'i-hu (Pen-hsi-hu)	Penki (Penhsi) Penchi	Penhsi
(Lu-shun) Ryojun (Port Arthur)	Lu-shun	Ryojun	Port Artur
Shih-chan	Shih-chan (16th Station)	Shihchan	Shichan
Shin-gishu (Sinuiju)			
Ssu-p'ing-kai	Ssup'ing-chieh (Ssuping-kai)	Ssupingchieh	Ssupingkai
Su-chia-tun	Su-chia-t'un	Suchiatun Sukiatun	Suchiatun
Sui-fen-ho (Pogranichnaya)	Sui-fen-ho	Suifenho Porgranichnaya	Pogranichnaya
Sui-ho	Sui-feng-tung	Suiho	Suihodo
Ta-hu-shan (Ta-fu-shan)	Ta-hu-shan	Tahushan	Tahushan
Ta-shih-chioa	Ta-shih-ch'iao	Tashihchiao	Tashihch'iao
Tao-an (Pai-cheng-tzu)	T'ao-an (Pai-ch'eng-tzu)	Taoan (Paichengtzu)	Taoan
Tung-chiang (Lahasusu)	T'ung-chiang	Tungchiang (Lahasusu)	Tungchiang
Tsitsihar (Lungchiang)	Ch'i-ch'i-ha-erh (Lung-chiang)	Tsitsihar (Lungchiang)	Tsitsihar
Tunghua (T'uno-hua)	T'ung-hua	———	———
Tun-hua	Tun-hua	Tunhwa	Tunhua
Wang-yeh-miao	Wang-yeh-miao	Wangyehmiao	Wangyehmiao
Wei-ho	Wei-ho (Wei-sha-ho)	Weiho (Weishaho)	Weishaho
Wu-yun	Wu-yun (Wen-ho-chen)	Wuyun (Wenhochen)	Wuyun
Yang-chia-t'un	Yang-chia-t'un	Yangchiatun	Yangchiatun
Yeh-pai-shou	Yeh-pai-shou (Yehpai-shu- possibly local pronunciation)	Yehpaishou	Yehposhou
Yen-chi	Yen-chi (Chu-tzu-chieh)	Yenchi, Yenki	Yenchi
Ying-kou (New chwang)	Ying-k'ou	Yinkow	Yingkou

3654 ~~3630~~—99—Manchuria—7-11-44—First Proof